ELECTRICAL TIMES

THURSDAY
10 APRIL
1952
NINEPENCE

ASTA certified

The complete range of
'ENGLISH ELECTRIC' Type 'T'
High Rupturing Capacity Non-Deteriorating
Cartridge Fuse Links has been ASTA
certified for Category of Duty 440AC4
to the 1939 edition of B.S.88
(the highest category at that time)
and for Categories of Duty 440AC4 and
440AC5 representing 25 MVA and 35 MVA
respectively to the 1947 edition
of B.S.88.

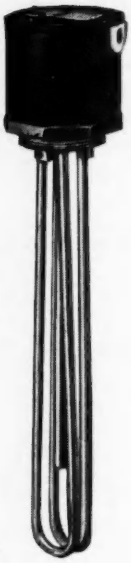
'ENGLISH ELECTRIC'

h.r.c. fuse links

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2
Fusegear Works, East Lancashire Road, Liverpool 10

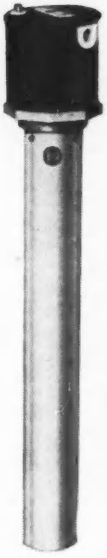
WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

F.7



to B.S.S?

the answer is YES!



Creda immersion heaters and circulators comply in every respect with British Standard Specification 1556/1949

Creda immersion heaters and circulators can be supplied with or without thermostat.
Installation is simple—with the Creda Easy Fix Flange, of course.
Completely new design coupled with exclusive manufacturing technique enable us to quote MOST competitive prices. Write for literature and price list

Creda

IMMERSION HEATERS & CIRCULATORS

MADE BY THE HOUSE OF SIMPLEX

Simplex Electric Company Limited
Oldbury Birmingham and Branches

A TI COMPANY

S&L
TUBULAR STEEL
LIGHTING COLUMNS
Type Gb. 594, 25 ft. M H.
Curved Double Bracket Arm
for Group 'A' Roads
SUITABLE FOR ELECTRIC LIGHTING
This is one of a series of illustrations indicating our range of standard tubular steel lighting columns, passed by the Royal Fine Art Commission. Other designs which include 13ft., 15ft., and 25ft. mounting heights, plain or fluted, will appear from time to time. A folder showing our standard columns will be sent on application.
STEWARTS AND LLOYDS LIMITED
GLASGOW · BIRMINGHAM · LONDON

A

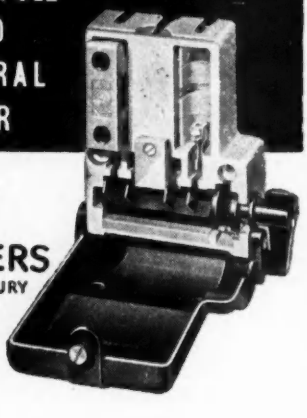
Burco

THE FINEST ELECTRIC WASHBOILER

BURCO LTD. ROSE GROVE BURNLEY - LANCS

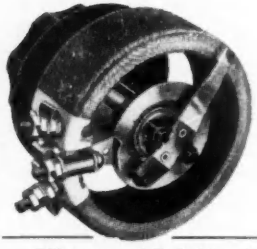
SEE OUR STAND C.303 AT THE B.I.F., BIRMINGHAM, MAY 5—16

SINGLE POLE AND NEUTRAL GEAR by SANDERS WEDNESBURY



ALL-INSULATED SWITCH FUSE WITH 15 AMP. FUSE LIST NO. N.101G.

TOROIDAL WOUND POTENTIOMETERS



Efficient and Reliable, these instruments are second to none. Our Technical service will be happy to advise you in any difficulty, so do not hesitate to get in touch with us soon.

CRESSALL

Registered Trade Name of

THE CRESSALL MANUFACTURING CO. LTD
Tower Street, Birmingham 19
Telephone: ASTon Cross 2666 (3 lines)
Telegrams: "OHMIC, Birmingham"

800 ohms/cmf

Temp. Coeff. of Resistance:
± 0.00002 max. from −50°c to +100°c

Improved electrical resistance alloy

Higher ohmic values

Compared with certain copper-base alloys widely used for high accuracy wire-wound resistors, the electrical resistivity of Karma is exceptional, being 800 ohms per circular mil-foot, at 20° C, it is more than 2·7 times as great. Thus, Karma makes it possible to wind even smaller precision resistors at yet lower cost per ohm.

More stable resistance

The low temperature coefficient of resistance of Karma remains constant over a much wider temperature range than that of, for example, Advance (Constantan). The "useful range" of Karma is four times that of Advance (Constantan) and more than eight times that of another widely-used alloy. Therefore, Karma is especially suitable for precision resistors subjected to severe temperature changes.

Low thermal EMF

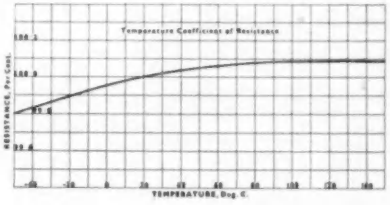
Error due to voltage generated by thermal EMF against copper, in the case of Karma, is entirely negligible.

High resistance to oxidation

The superior resistance of this nickel chromium alloy, Karma, to surface oxidation enables it to retain its fine electrical properties longer than copper-base alloys.

Higher Tensile strength

Besides its outstanding electrical qualities, Karma has physical advantages over the commonly accepted alloys. Its higher tensile strength permits faster winding speeds; its lower thermal expansion minimises distortion and movement in windings.



We will be glad to supply complete data.

BRITISH DRIVER-HARRIS COMPANY LTD
MANCHESTER, 15

"NICHROME"

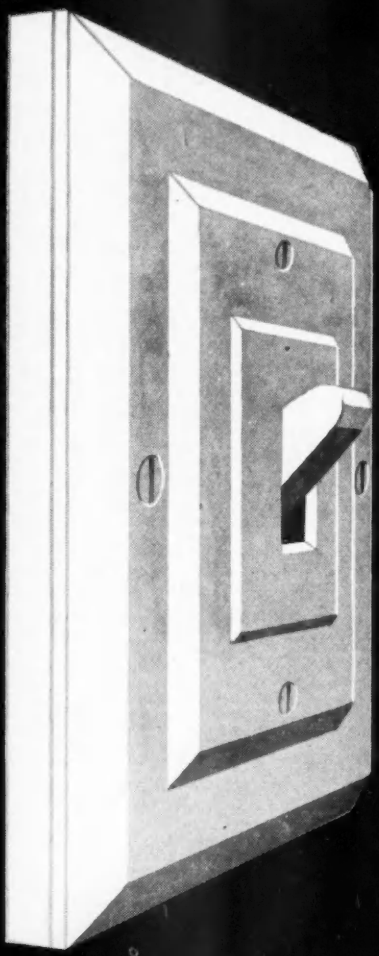
Introducing the

THE SURFACE SWITCH

SURFLUSH

THAT LOOKS FLUSH

the surface switch that looks flush



The SURFLUSH switch cuts fixing costs

A/C ONLY

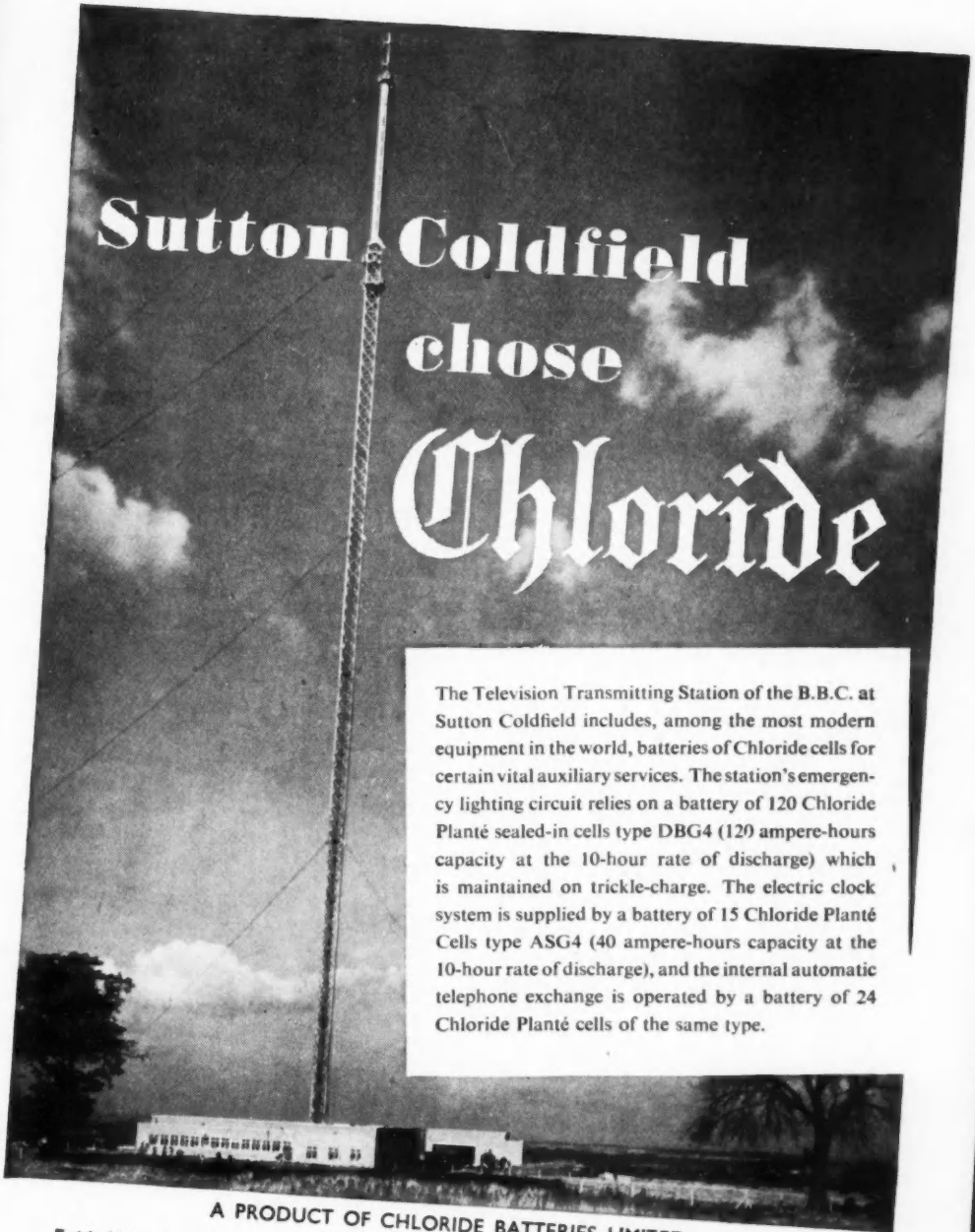
See it at the B.I.F. Stand C.609.

FALKS

FALK, STADELMANN & CO. LTD

. . . Meets all the requirements of 404 J (12 Ed. Wiring Rules)

91, FARRINGDON ROAD, LONDON, E.C.1 and BRANCHES



The Television Transmitting Station of the B.B.C. at Sutton Coldfield includes, among the most modern equipment in the world, batteries of Chloride cells for certain vital auxiliary services. The station's emergency lighting circuit relies on a battery of 120 Chloride Planté sealed-in cells type DBG4 (120 ampere-hours capacity at the 10-hour rate of discharge) which is maintained on trickle-charge. The electric clock system is supplied by a battery of 15 Chloride Planté Cells type ASG4 (40 ampere-hours capacity at the 10-hour rate of discharge), and the internal automatic telephone exchange is operated by a battery of 24 Chloride Planté cells of the same type.

A PRODUCT OF CHLORIDE BATTERIES LIMITED

Exide Works, Clifton Junction, Nr. Manchester, and 137 Victoria Street, London, S.W.1.

MAKERS OF EXIDE BATTERIES

GREECE. This picture shows officials of Telecommunications Organisation of Greece Ltd. using a "Megger" Insulation and Continuity Tester, Series 2, during a routine check at a telephone exchange in Greece.

HOLLAND. "Megger" Testers are used by the Dutch Post Office. This photograph shows Dutch P.O. engineers using a 500-volt "Bridge-Megger" Varley Testing Set to test a faulty line of a telephone cable in a polder-dike.

"MEGGER" TESTERS SERVE WORLD COMMUNICATIONS

UNITED KINGDOM. 64 per cent. of all faults on the 34,000 miles of main underground Post Office cables in the United Kingdom are located by "Megger" Testers.

ITALY. The Societa Telefonica Tirrena, which operates the telephone lines of Liguria (Genoa and the Riviera), Tuscany, Central Italy, the Vatican City and the Island of Sardinia, uses "Megger" Insulation Testers in the maintenance and localisation of faults in cables balanced in groups between cities.

AUSTRALIA. "Bridge-Megger" Testers prove equally valuable to the Post Office down under. Instruments equipped with Varley fault localisation facilities are used extensively by the Australian Postmaster-General's Department for the location of faults on underground cables. They report that "it is outstanding when used to perform this function."

ALL OVER THE WORLD the famous series of "Megger" Insulation Testers are used by public authorities, industrial undertakings and commercial enterprise because these instruments are more accurate, more reliable and sturdier in use.

For full details send for Publication J 051/1-8.

MEGGER TRADE MARK

EVERSHED & VIGNOLES LTD.

ACTON LANE WORKS · CHISWICK · LONDON · W.4

Telephone: Chiswick 3670 *Telegrams: Megger, Chisk, London* *Cables: Megger, London*

6/76

For power engineering . . .

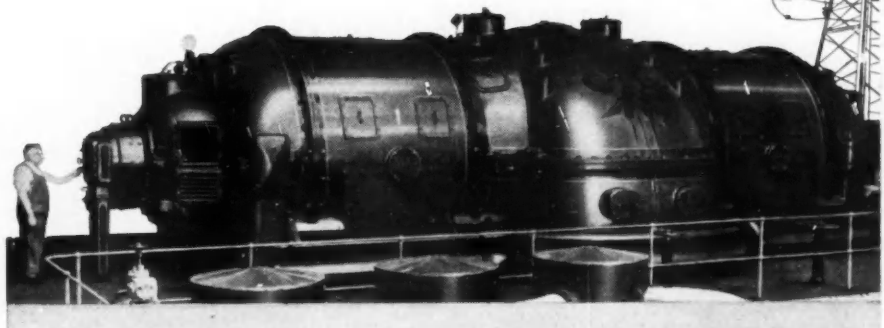
Stands C.519 and 418,

British Industries Fair—

Birmingham Section

For the first time we are exhibiting a 2,500 kW BRUSH-Ljungström Turbo-Alternator Set—one of a range which covers output from 1,500 to 60,000 kW.

Other exhibits include TRANSFORMERS SWITCHGEAR, MOTORS & ALTERNATORS



the best answer is BRUSH

The Brush Electrical Engineering Co. Ltd., Loughborough, England

London, Birmingham, Cardiff, Manchester, Leeds, Newcastle, Glasgow, Bath, Sheffield, Dublin

15-91

KAP-IT-AL-IST

Jack Jones is a capitalist, he has three hens; he feeds them with scraps from the kitchen, obtains eggs and makes a profit. Mr. Smith is a bloated capitalist, he has twenty hens and sells ten eggs a day—profit—puts the money in the bank. One day he buys another hen house and more hens. He now sells 50 eggs a day and puts the profit in the bank—ploughs it back. He can now rent five acres and buy more hens and houses which will produce more eggs. Mr. Do-nowt his neighbour used to be friendly but will not speak now.

GUARANTEED FOR EVER

Belfast, Birmingham, Bristol, Dundee, Glasgow, London
Manchester, Newcastle, Peterborough, Sheffield, Wolverhampton

REACH OUT –

AND BACK

with

B.I. Callender's

EXTENSIBLE

T.R.S. FLEXIBLE CORDS

Ideal for supplying power to portable electric equipment, these cords can be extended many times their coiled length. As tension is relaxed they automatically re-coil themselves to their original compact form.

May we send you further information?

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

Electrical Insulation

MICA

Washers
Plates
Commutator Segments
Stampings
Stove Plates
Heater Strips,
etc.

MICANITE

Mouldings, Commutator Vee Rings, Tubes, Covered Bars, Commutator Segments, Heater Strips. Sheet Material in Moulding, Flexible, Heat Resisting and Commutator Qualities, etc.

BAKELITE

Tubes
Bushes
Bobbins
Washers
Stampings
Panels
Covered Bars,
etc.

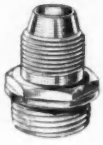
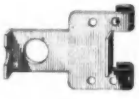
Manufactured by

EAST LONDON MICA WORKS

RINGWOOD ROAD, WALTHAMSTOW, LONDON, E.17

'Phone: KEYstone 4254 *Telegrams: Elmicmer, Easphone, London*

Automatic Productions *Capstan & turret*

Lathe work  *Pressings in all metals* 

Brass caps & Dome nuts *Clips*

in every shape & size *Deep sheet –*

metal shells

GRIFFITHS, GILBART, LLOYD & CO. LTD.

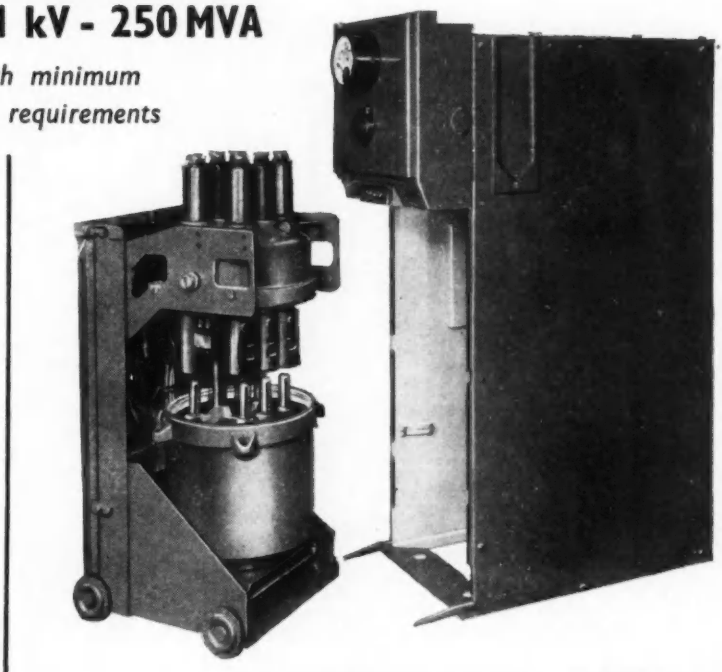
EMPIRE WORKS · PARK ROAD · BIRMINGHAM 18

Telephone: NORTHERN 2132/4

G·G·L

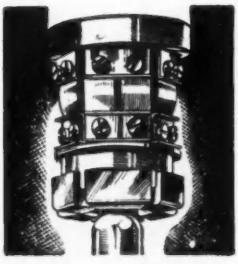
FOR H.V. ELECTRICITY SUPPLY DISTRIBUTION UP TO 11 kV - 250 MVA

with minimum space requirements



and **RELIABILITY IN SERVICE**

Innumerable short circuit tests prove the dependability of the **BV UNIT**



The 'FERGUSON PAILIN' BV unit is self-contained, of the metalclad type, giving adequate protection against fire risks, and designed for extension to similar, or other, switch units and isolators as required.

Each circuit breaker is contained in its own truck, giving easy access for inspection or maintenance, and is interchangeable with other units where ratings and small wiring interconnections are identical.

Vertical isolation of the breaker ensures minimum space requirements of the unit, whilst adequate interlocks make opening and closing operations completely safe and prevent mal-operation.

The separate spring loaded segments of the fixed contact in an oil circuit breaker contact assembly (cross jet pot removed). This feature ensures perfect alignment when the lower contact moves into the closed position.
Full data gladly supplied on request

Performance proved— A.S.T.A. Certificated

FERGUSON PAILIN LTD.

MEMBER OF THE A.E.I. GROUP OF COMPANIES

Switchgear Specialists

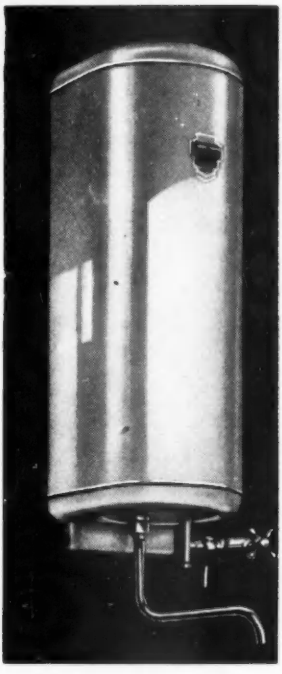
MANCHESTER, 11. ENGLAND

The Heatrae *DOT*

— is a *fully-automatic* Electric Water Heater with integral fine-precision thermostat that effectively controls current consumption. Beautifully styled and compact in size (with flat back) it is eminently suitable for use over sink or wash-basin. From the maintenance viewpoint *THE* best feature of all is:

- **An external terminal box is provided for reception of supply cable. This avoids risk of damage by heat. The connection can be made without removing bottom cover of heater.**

Made in 1½ and 3-gallon sizes — bottom or top outlet models.



Heatrae

HEATRAE LTD • NORWICH

Manufacturers of: Electric Water Heaters, Oil Heaters, Immersion Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Flame-proof Heating Apparatus, Breakfast Cookers, Electric Fires, Food Trolleys, Warming Plates, Air Heaters.

VISIT STAND C 216

C·M·A

AT BIRMINGHAM
MAY 5th-16 1952

B·I·F

TEL: FAIR 207

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BROOK MOTORS LTD

HUDDERSFIELD • ENGLAND

MAKERS OF A.C. ELECTRIC MOTORS AND CONTROL GEAR

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HIGH VOLTAGE TESTING EQUIPMENT

FERRANTI ARE SPECIALISTS in the manufacture of a.c. and d.c. equipment for all kinds of routine and research testing, and are backed by 70 years' experience in the manufacture and development of electrical apparatus.

The illustration is a 2,100 kV, 12-stage Ferranti Impulse Generator installed in the Ferranti Research Laboratories.

FERRANTI

FERRANTI LTD · HOLLINWOOD · LANCASHIRE · ENGLAND

FT 113

ELECTRIC POWER TRACK

gives COMPLETE PROTECTION

against trolley wire accidents

ASEA ELECTRIC POWER TRACK used in place of bare wires provides a completely safe system. Designed to comply with the requirements of the Factories Act, it protects fully all live metal so that accidental shock is impossible. It can thus be placed at any level with complete safety and is the ideal method of feeding electric cranes, pulley blocks, furnace chargers, and other moving power driven industrial equipment.

The crane installation illustrated above is fully equipped with Power Track and shows the neat and inconspicuous fitting. It ensures complete protection against shock.

ASEA ELECTRIC, LTD.

Associated with Fuller Electrical & Manfg. Co. Ltd.

FULBOURNE ROAD, WALTHAMSTOW, LONDON, E.17

Phone: LARkswood 2350 (10 lines) *Grams: Autosyncro, Telex, London*

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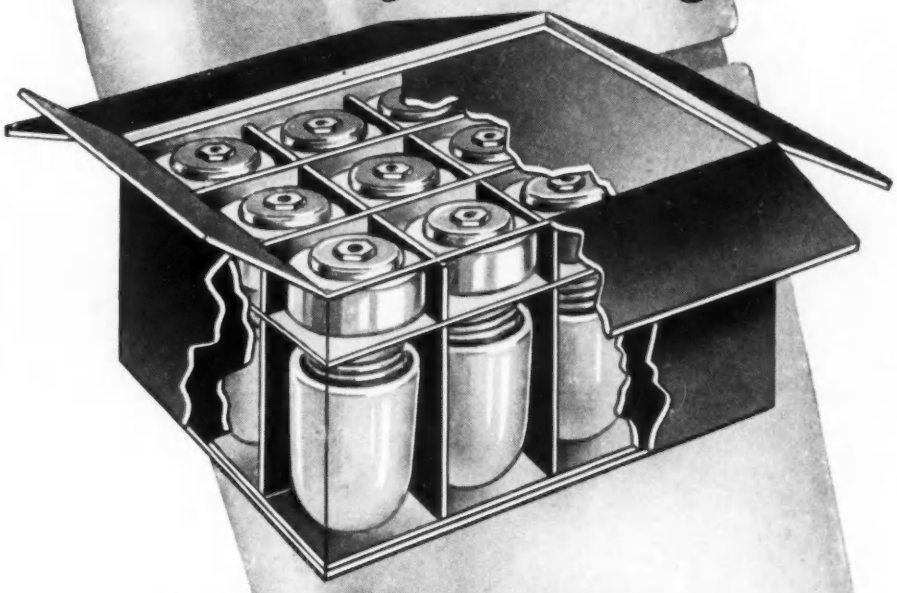
DUBLIN — Hancock House, Fleet Street (Phone: 76534)

A R·E·A·L *pack for a* R·E·A·L *Watertight Fitting*



Buying by the dozen is a sensible thing to do, when fittings are packed this way! Easy to handle . . . no stock breakage . . . no searching for rubber rings or lampholders . . . no cleaning of straw-covered glasses. R.E.A.L. Watertight Fittings arrive in pristine freshness in this rail-certified container.

Probably the use of R.E.A.L. non-corrodible watertight fittings is standard practice with you; in which case you already know that erection cost is shillings less than ordinary — and ordinarily packed — watertight fittings.

Issued by Rowlands Electrical Accessories Ltd., R.E.A.L. Works, Birmingham, 18.

REGD. TRADE MARK
NIPHAN

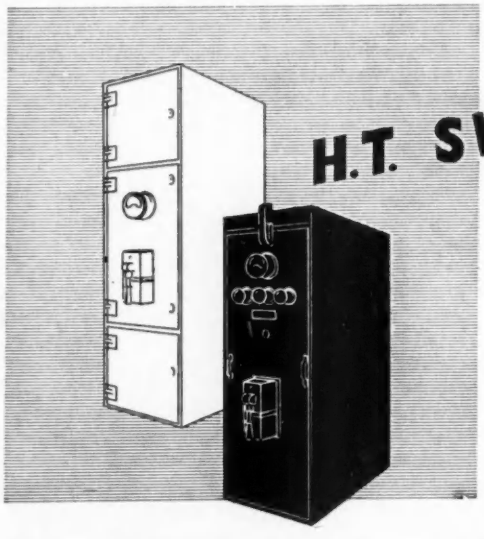
WEATHERPROOF METAL-CLAD PLUGS, SOCKETS SWITCH PLUGS, ETC. for all electrical purposes

5 300 amp.
250 500 volt.

• APPLY FOR NEW REVISED PRICE LIST

SIMMONDS & STOKES (NIPHAN) LTD
MANUFACTURING ELECTRICAL ENGINEERS
Victoria House, Southampton Row, London, W.C.1 · Holborn 8637 and 2163

OVERSEAS AGENTS: *S. AFRICA, Hubert Davies & Co., Ltd., Johannesburg. CEYLON, Walker & Greig, Ltd., Colombo. NEW ZEALAND, Samuel Brown, Ltd., Wellington. KENYA, R. W. Ketchley & Co., Nairobi, British East Africa.*



H.T. SWITCHGEAR

AIR - INSULATED
DRAW-OUT TRUCK and
FIXED CUBICLE TYPE

•

A.S.T.A. CERTIFIED
BREAKING CAPACITIES
150 MVA at 6,600 Volts
150 MVA at 11,000 Volts
250 MVA at 6,600 Volts
250 MVA at 11,000 Volts

•

THE NEW SWITCHGEAR CONSTRUCTION CO. LTD.
Associated with the Hackbridge & Hewittic Electric Co. Ltd.
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TELEPHONE: VIGilant 8234

Leadership...

With leadership comes responsibility—the obligation to maintain a standard of excellence that is accepted automatically as the best. There can be no finer example of this constant adherence to quality than the continued preference for BENJAMIN Lighting Equipment. Whatever the need—whether for indoor or outdoor lighting—it is always . . .

Better by
BENJAMIN
REGD.

THE BENJAMIN ELECTRIC LTD
(*Established* 1908)
Brantwood Road, Tottenham, London, N.17.
Telephone : Tottenham 5252 (5 *lines*)
Telegrams : "Benjalect, Southtot, London."

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Midland 5197

LEEDS
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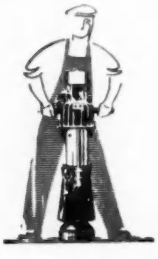
Leeds 25579

One man . . . plus . . .

One man — and not even a skilled one — can soon speed the work and cut the costs with a Warsop Power Tool.

Take the Warsop Breaker, for example. It is completely self-contained, powerful yet economical in operation, and does many jobs, including breaking, cutting, spading, pile driving, fencing and light ramming. Its brother, the Rock Drill, makes short work of stone quarrying, clearing boulders, driving new roads, erecting fence posts in concrete, and many similar operations.

Warsop Centrifugal Pumps are also simple to operate and require little attention. One man can easily carry the smaller models by hand, or in a wheelbarrow; the larger models are trolley-mounted with cushion tyres for greater mobility.



Last, but not least, there's the well-known 'Benjo' Rammer, a power tool that does a remarkably fine job of consolidation. Simple and untiring to operate, it gives 100% reinstatement, and will withstand the most rugged conditions.

There's no doubt about it — one man becomes "one man . . . plus" with a WARSOP power tool. Please write for leaflets, or ask us to arrange a demonstration for you.

10 Sales and Service Stations in the British Isles supply and maintain Warsop Breakers, Rock Drills, 'Benjo' Rammers and Centrifugal Pumps.
Branches at London, Taunton, Bedford, Burton-on-Trent, Stockport, Newport (Mon.), Leeds, Glasgow, Belfast. Dublin.

WARSOP SERVICE

DEPT. ET3

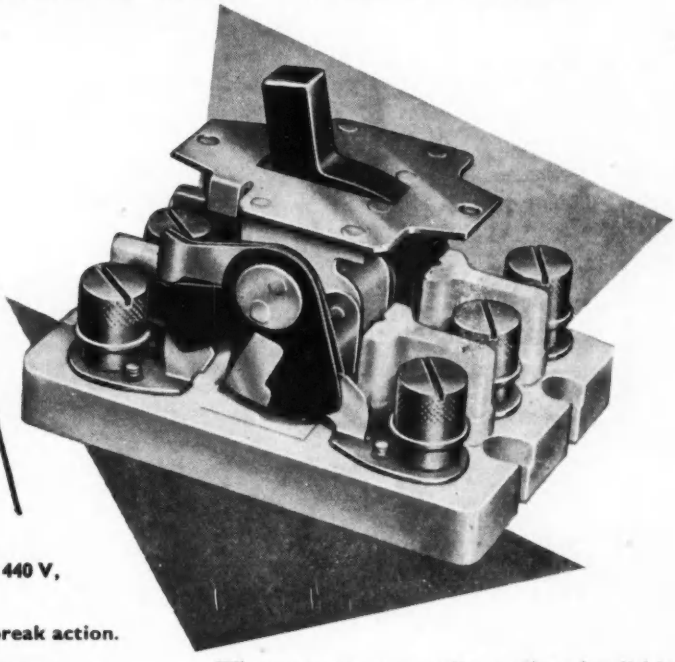
WARSOP POWER TOOLS LTD.

27 REGENT STREET, LONDON, S.W.1
Telephone: REGent 4632 (4 lines)
Cables: Warpetdril, Piccy, London

ARROW

PRECISION BUILT

THREE-POLE TUMBLER SWITCH



- 20 A 600 V, 25 A 440 V, 30 A 250 V.
- Quick make & break action.
- With large screw-cap terminals.
- Porcelain base.
- Panel or baseboard mounting.
- Bakelite operating lever.

When you want a really good and reliable three-pole tumbler switch in which *every* detail of design has been most carefully thought out, you cannot do better than ask us to send you particulars of our catalogue No 80104 P — the switch you see illustrated.

Our fifty years experience of switch manufacture and our world-wide reputation is your guarantee of a sound job.

Another precision built product by ARROW

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ARROW ELECTRIC SWITCHES LTD

CHIEF ENGINEERS—
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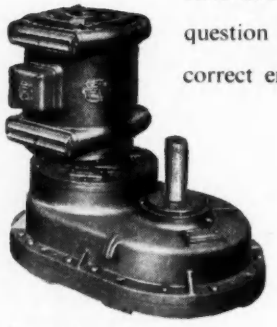
L.D.C. electric motors are built in a large number of standard sizes and types covering a wide range of outputs. When it's a question of special requirements L.D.C. supply motors of the correct enclosure for *every* industrial situation.



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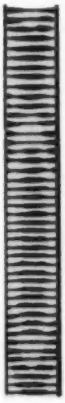
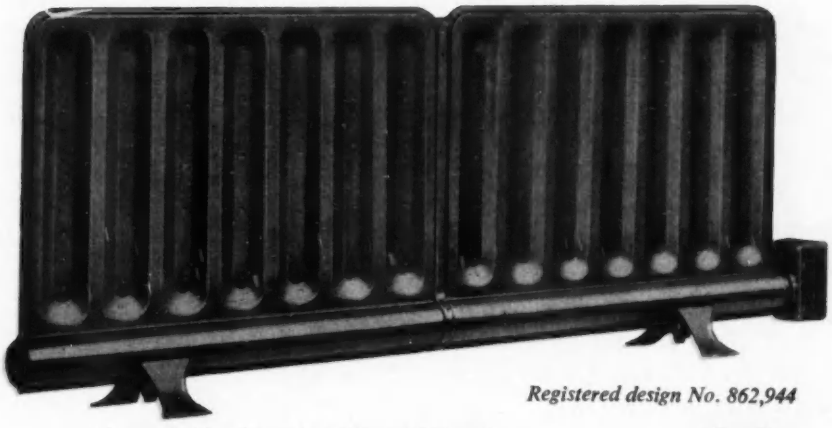


Model Illustrated 56″ x 20″. Rating 1000 and 1500 watt.



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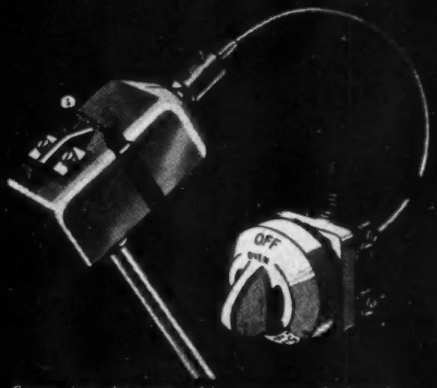

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10 V	250μA	10 V	1 A	Maximum indication 20 MΩ
25 V	1 mA	25 V	2.5 A	0-2,000Ω } using internal batteries
100 V	10 mA	100 V	10 A	0-200,000Ω } using internal batteries
250 V	100 mA	250 V		0-20 MΩ } using internal batteries
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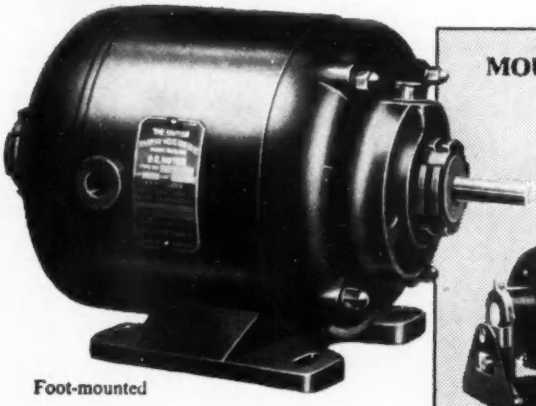

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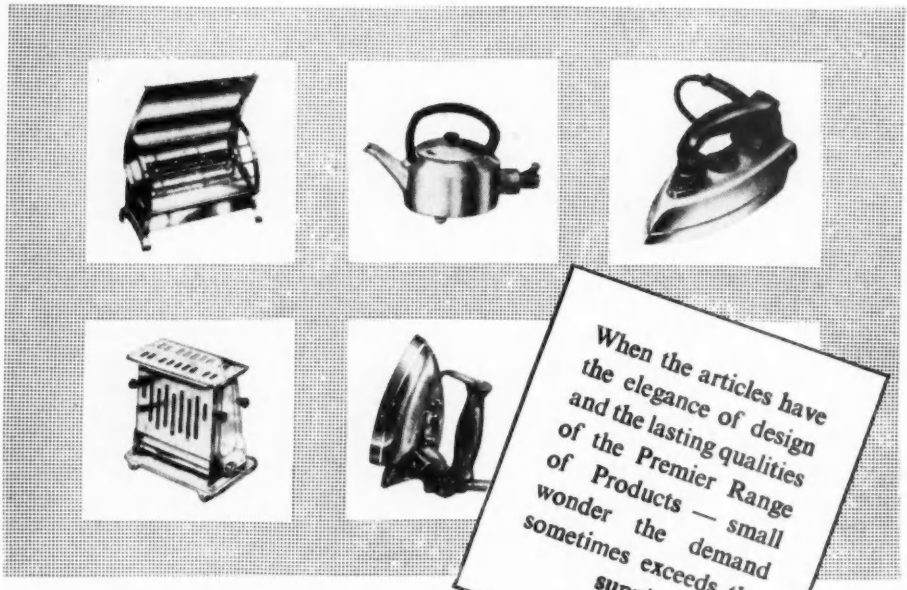

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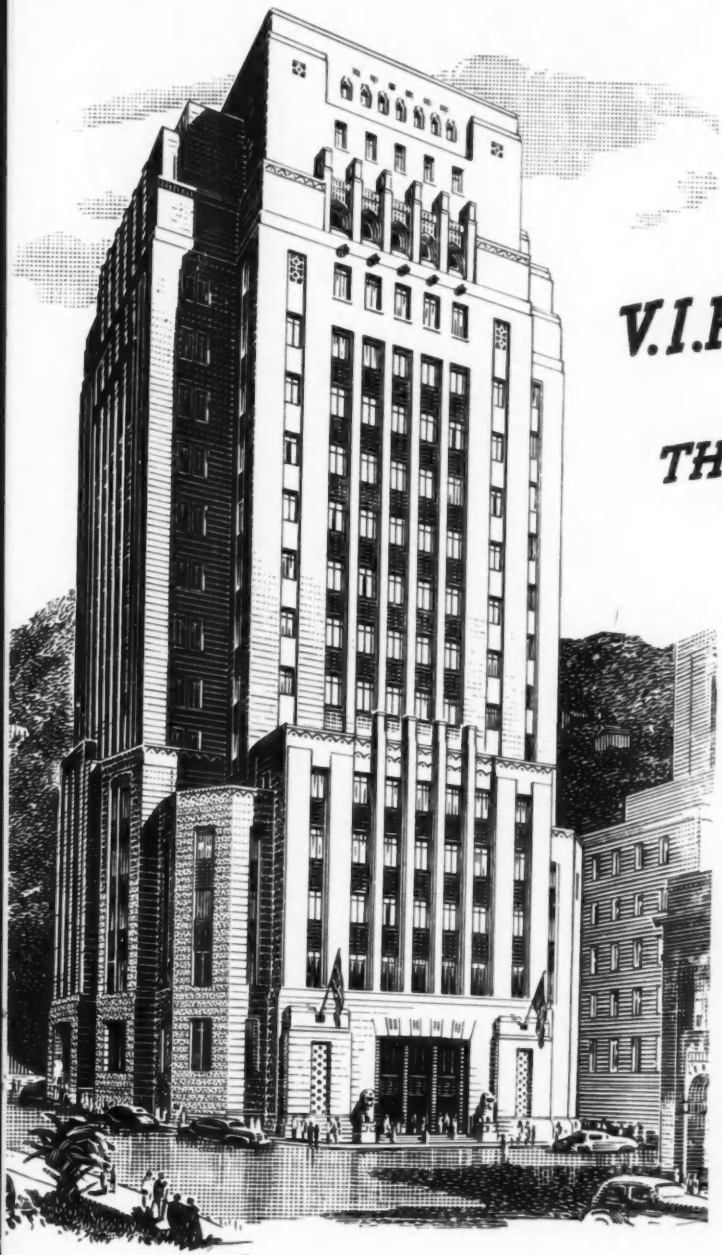

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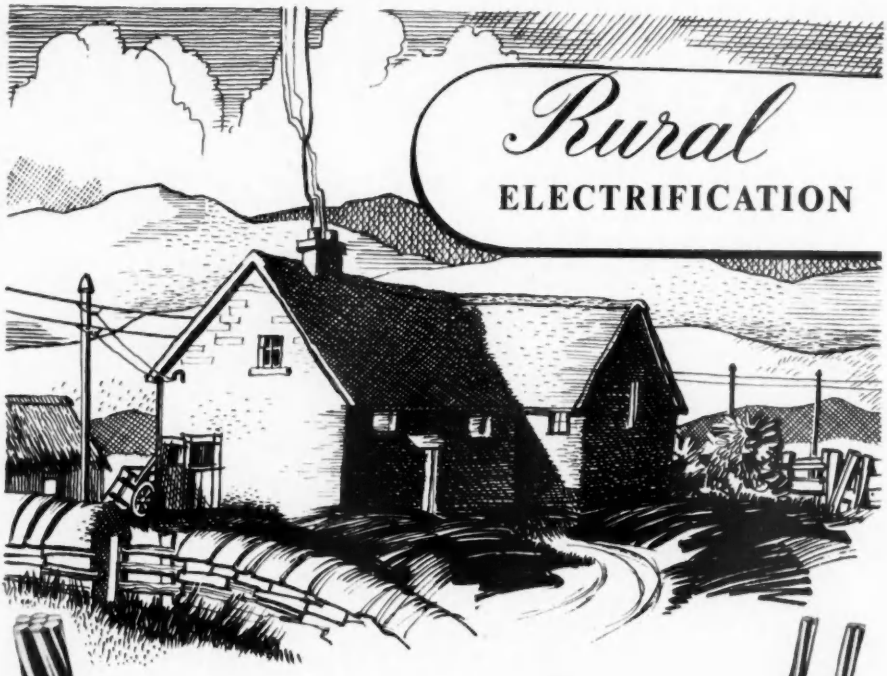

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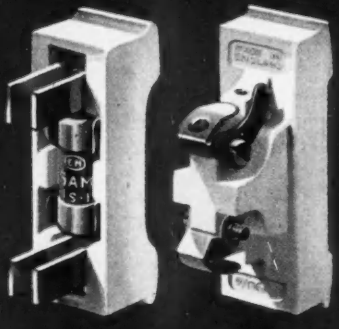

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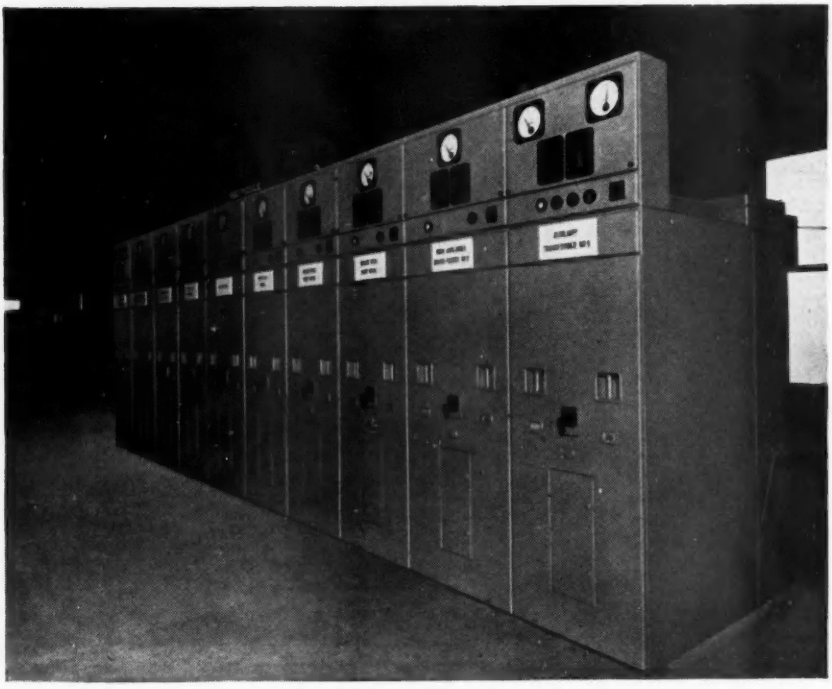

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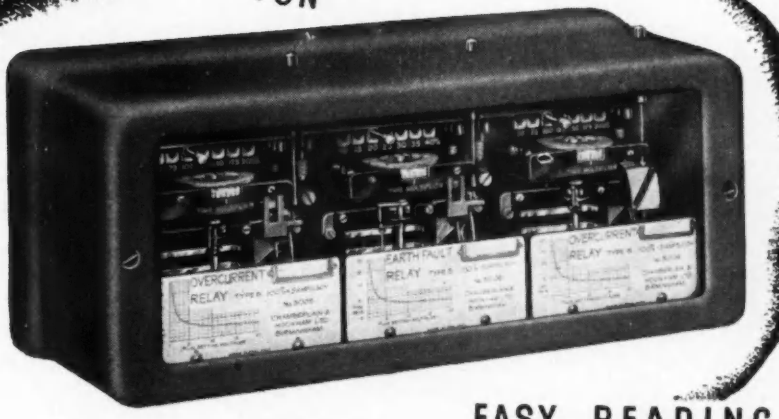

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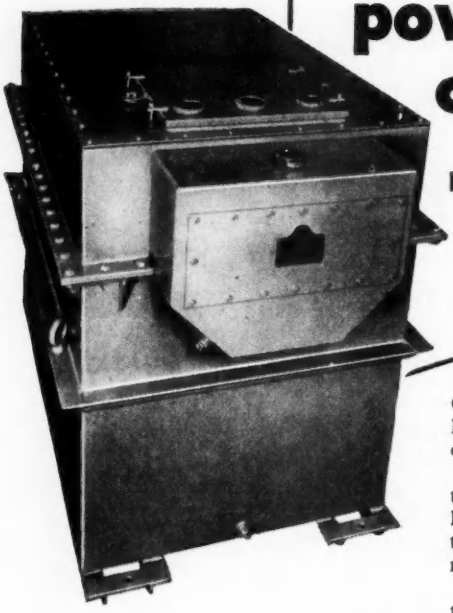

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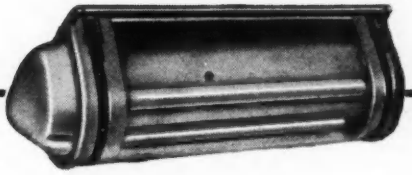
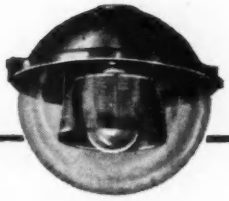
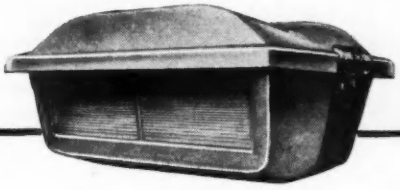


BOROUGH

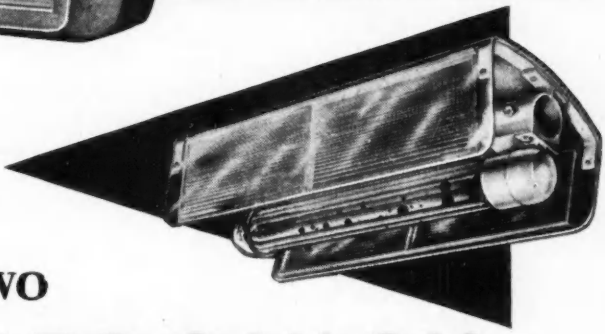
S.S. FIFTY-ONE





S.O. FIFTY

And now the S.O. FIFTY-TWO



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ELECTRICAL TIMES

Vol. 121 No. 3153 THURSDAY, 10 APRIL, 1952

PUBLISHED EVERY THURSDAY

SIXTY-FIRST YEAR OF PUBLICATION

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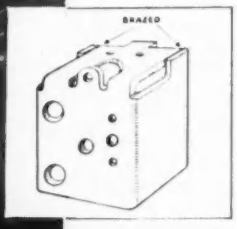
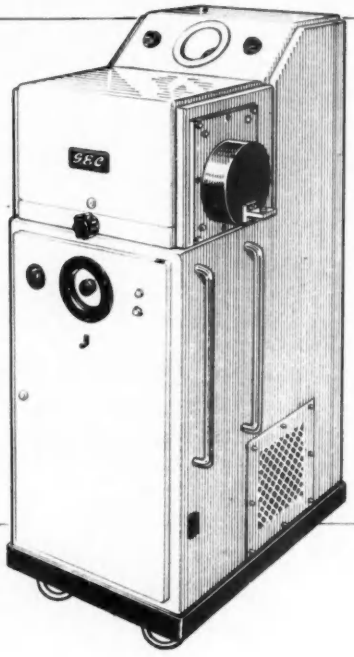


When a gas flame was used to braze the box yoke the spread of heat caused considerable distortion so that it was necessary afterwards to mill the top face and also to redrill the holes. Both these operations are avoided by using H.F. induction heating, and output is increased by 280%.

The G.E.C. 2kW Induction Heater used in this application has many features which make it eminently suitable for a wide range of applications, including the hardening of small parts, soldering and brazing. Details of the generator are given in leaflet PH 1243.



G.E.C.

H.F. INDUCTION HEATING

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Editorial

NOT PROVEN

NOT even the quiet and restrained atmosphere of the Institution's lecture theatre was able to extract a lowest common factor of agreement from advocates of the contemporary solid fuel vogue and doughty campaigners for the all-electric ideal who clashed in discussion of an I.E.E. paper last week. Listening to the many points made in contributions which were almost all at a high level of competency, the realisation grew again of how complex is this problem of domestic heating; of how many-sided it is. Despite all the investigations that have been made, overall knowledge of the subject remains remarkably incomplete. Electrical engineers were shown to have incorrectly interpreted published results of solid fuel investigators; these latter, in turn, were revealed as lacking appreciation of the householder's yardstick for the worth of heating, and as almost wholly ignorant of electricity supply economics. If the meeting proved nothing conclusively about the best method of house heating, it did at least show how unwise it would be at this present juncture to interfere with the public's freedom of choice of fuels.

EXPERIMENTS NEEDED

THIS point was well taken by Mr. SCHILLER. When speaking late in the discussion, he supported the author's plea for large-scale trials of all-electric houses as well as those using other fuels. In the absence of the results that such experiments can give—and for this purpose Mr. Schiller does not regard the Abbots Langley tests as large scale—there is a real danger that a national fuel policy may be laid down on an unsure foundation of unproved hypotheses. Once a policy is formulated, professional administrators are likely to be substituted for engineers and scientists in securing its implementation. As experience with such matters as the thermal insulation of houses has shown, when this occurs there is little hope of obtaining permission for any departure from the letter of a policy even though such a step will amply fulfil its spirit. So it is to be hoped that those charged with securing the future of the electrical industry are taking care that the part the electric heating load can play is not lost for lack of convincing experiments.

CAESAR'S WIFE

NOW that the B.E.A's much-attacked Bill to allow further development of Welsh hydro-power has received its long-delayed second reading in the House of Commons, some reasons for the intensity and unyielding nature of the opposition have become clear. Setting aside the pseudo-technical arguments advanced by some members, the major objections have arisen from concern for the beauty of the countryside if the scheme was carried through. Yet these were largely silenced when Mr. Geoffrey Lloyd announced the Authority's willingness to accept a planning authority clause in the Bill. It may be wondered why this readiness to meet criticism was not made plain before. Apparently the B.E.A., although promoting the Bill, has studiously abstained from any lobbying which is usual with a Private Bill. The Authority's attitude has been to regard its job as finished when the Bill was prepared and submitted; if Parliament did not like it, it would of course submit to its ruling. But it would not, by any active advocacy, lay itself open to a charge of pressing upon an unwilling nation anything that could be later castigated as a "grandiose scheme." As a nationalised body, it had to remain above suspicion. This approach is understandable in view of past attacks, but it is not difficult to envisage circumstances in which this attitude of sitting back, blameless though it may be, would work to the eventual detriment of the consumer.

STATUS FOR MAINTENANCE

IN these days when replacement of plant is becoming more difficult, when the backlog of the war years has not been made good and increasing restrictions are being placed on capital requirements, the task of maintenance, and, more important, preventive maintenance becomes of vital concern to industry. Only by the proper care of the machinery of production can industrial output be sustained. Industry is coming to regard the maintenance engineer as one of the vital factors in the efficient running of a factory—no longer is he relegated to the position of something approaching an odd job man. There is a growing appreciation of his work as one that can maintain or increase output, without raising the cost per unit of products. This recognition is reflected in the paper that was presented at the Institution of Mechanical Engineers last week devoted to this subject. It is clear that much work remains to be done in this field. The first step lies in the raising of the status of the maintenance engineers. Better standards of training are being demanded than ever before and technical qualifications are being pushed ever higher. This is an inevitable concomitant of the new responsibility that is being shouldered by the maintenance engineer.

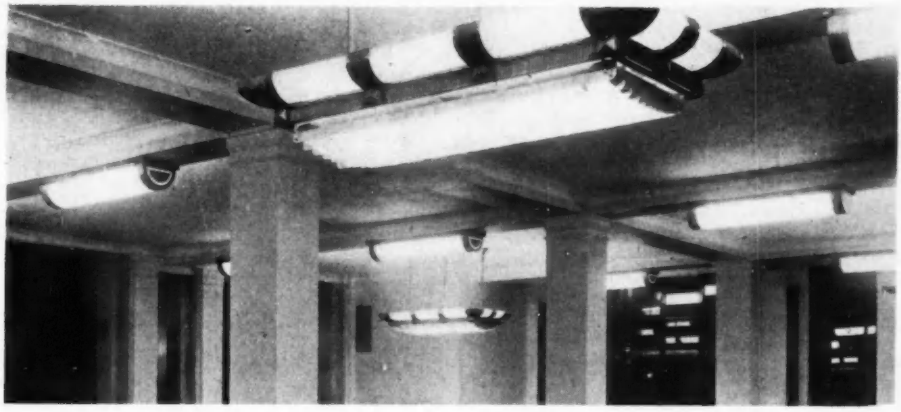
PAN-EUROPEAN ELECTRICITY

GENERAL EISENHOWER'S recommendation, in his full authority as supreme allied commander, of a European system for electric power generation and transmission, attracts attention to a scheme which has often been advocated. This latest revival of the idea, now limited to Western Europe, is mentioned by the General in his annual report to the N.A.T.O. chairman, where he stresses the fact that many of the problems he has had to meet have been economic, rather than military. In developing this theme, he suggests that a scheme analogous to the Schuman plan for coal and steel, but applying to electric power, is worthy of consideration. Its effects, he suggests, could be "profound and far-reaching." It is not at all clear on what technical basis the General comes to this conclusion, and there does, indeed, seem some evidence that much of its value for him would lie in the practice in international co-operation which it would give. None the less, the suggestion must be examined, and for this purpose it is fortunate that appropriate instruments are already at hand either in those technical groups organised by N.A.T.O. or by E.C.E. whose work has previously been discussed in our columns.

REVERIE IN KINGSWAY

TO those of us who have for so many years wandered in the byways of Bloomsbury, the closing of the Kingsway tunnel last Saturday will leave an unfillable void. No longer will be heard that grinding of wheels which heralds the turning of a tram into its exclusive thoroughfare; no longer will it be seen towering majestically as its exercises its royal prerogative of right of way. We remember the thrill, even adventure, of our first ride on those quaint squat trams and the amazement on first seeing the large double deckers come sweeping up from out the depths beneath the road. Even for the sophisticated youth of today London held no thrill comparable with a ride through the Kingsway Tunnel. But all this is gone. Only the tunnel itself remains, those feeble lights have been dimmed and the unearthly stations swallowed up in the silence of the far-off roar of the workaday world. What is to become of this relic of the heyday of London's traction system? Those sharp bends, round which the trams lurched with such confidence, defy the lesser bus and the stations which offered the privilege of alighting by the driver's cab prohibit normal transport vehicles without the provision of costly crossovers, not to speak of the expensive ventilation system which would be necessary. Is this tunnel therefore to fall into desuetude or will it one day return once more to full glory as part of a North-South trunk road?

Meteor



INTERFERENCE SUPPRESSION for Fluorescent Lamps and Fittings

First of a series of articles which will discuss some problems incidental in lighting with fluorescent lamps

By W. A. STICKLEY,
(Ekco-Ensign Electric Ltd.)

LOW pressure hot cathode fluorescent lamps when properly installed and fitted with the customary capacitor type suppressor, rarely interfere with the reception of radio programmes. The following notes deal with the case which may arise when circumstances create abnormal conditions.

The modern radio set is by virtue of its extreme sensitivity an efficient detector of any electro-magnetic disturbance whose field reaches the close area of the set. Nearly all alternating current devices create such disturbance, and many direct current devices, such as d.c. motors or d.c. carbon arcs, will produce similar effects.

Frequency Considerations

Fortunately, much disturbance is at low or mains frequency, and as radio sets incorporate means for disposing of such low frequency spurious waves they do not reach the loud speaker and so do not cause interference which is objectionable. Therefore, when dealing with radio interference, we are concerned only with those devices which radiate the higher frequency waves. These troublesome disturbance waves may have a frequency ranging from 200 kc/s (long-wave radio) to 60 Mc/s or more (television), but the fluorescent lamp and/or lighting fitting is seldom a nuisance to the television set user.

The foremost of the disturbance waves are those caused by electric sparks, whether generated by the make or break of a small tumbler switch, the commutator of a motor, or, more important to the lighting engineer, the sparking action originating in the region of the electrodes of a fluorescent lamp. This "sparking" is an electrical effect and will not, of course, be confused with the sputtering of white-hot cathode particles which can sometimes be seen in the region of the hot spot of the electrodes. It is worth noting that most discharge lamp radio interference is due to the radiated or conducted waves from this electrode effect and hardly at all from the mercury arc column.

This is understandable, for the arc, although cyclic and varying, is at least regular, but the electrode spark depends upon the state of the cathode and various circuit conditions for its size and frequency and will at all times be uncertain in all its characteristics. Briefly, the arc repeats itself exactly every cycle in a characteristic way and is thus manageable, whereas the spark may vary each cycle, thus producing a wave of complex properties which

will contain harmonics of very high frequency and is much less manageable.

When a spark generates a high frequency current an electro-magnetic wave is radiated through space. Interference so caused is called direct radiation interference. When high frequency currents (possibly from that same spark and possibly simultaneously) travel back through the lighting fixture wiring to the radio set mains input, that form of interference is called mains conducted interference. The same mains conducted high

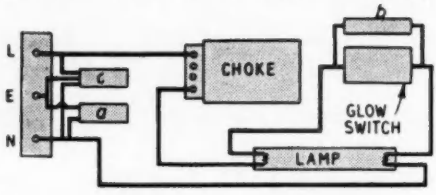


Fig. 1. Positions for connecting various suppression components to a fluorescent lamp and its control gear. (a) Artificial earth. (b) Additional capacitor across starter switch. (c) Suppressor for use when mains interference is proved

frequency currents can, by induction, become transferred to nearby wiring or metal work and re-radiate interference. This effect is accordingly known as re-radiated interference.

There are other circumstances which may result in interference but the three forms discussed are the only ones likely to be encountered by the lighting engineer.

Interference Reception

It is a fact that the majority of radio users limit their listening to the "Home" stations and so rarely have an efficient aerial system installed. Thus, a few feet of cable round the picture rail is all that is required, and it is in these circumstances that we are particularly troubled by radio interference complaints. With television, the circumstances are different, for an efficient aerial system with screened and earthed feeder wires is an essential and, therefore, interference from inside the building is rare. However, direct interference is possible in either case if the interfering source is within twelve feet of the actual aerial or unscreened lead in wire.

Mains conducted interference can enter either radio or television sets by way of the set's mains input and has been known to travel as far as 500 yards. Such long distances are rare, for usually the high frequency currents dissipate themselves through the capacitive effect of the cable.

It will be obvious that the first requirement before any attempt at suppression can be made will be to correctly diagnose the class and extent of the interference. Proceed as follows:

Suppression Testing

First, ensure that the lighting installation is the transgressor, remembering that some outside interference source could be using the lighting wiring to produce a re-radiated effect. This can be proved by switching off the lighting and removing *both* fuses, or fuse and neutral link, when interference will disappear unless due to re-radiated interference.

Secondly, replace fuses and switch on lighting installation allowing at least ten minutes for the lamps to reach equilibrium, and using a battery portable radio set search for interference by revolving the set on its axis at approximately nine feet from lamp (or lamps). If no interference is noticed, then the complaint must be due to mains conducted effect. This test is best carried out with the portable set at "medium-wave" and turned a little to either side of one of the "Home" stations.

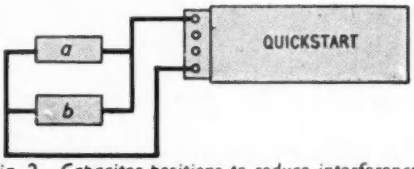


Fig. 2. Capacitor positions to reduce interference where Quickstart units are in use

Finally, if interference is received during test (2), then direct radiation is present. Next, switch to short and then long wave and note interference on each wave band.

Suppression

If interference from the lighting fitting is proved, proceed as follows in order to cure or reduce such interference. All tests should be made after the lamp and fitting have had an opportunity to warm up and when a lamp has been switched off it should be allowed about ten minutes to run again, and so reach equilibrium before the next test is undertaken.

Test mains voltage and fluorescent lamp current and ascertain whether these are reasonable. Some interference may be caused by either or both of these being abnormal. Also make certain the fitting is properly earthed and that the earth is a good one.

An artificial earthing component, Fig. 1(a). comprising a high resistance, 100,000 ohms, and a small capacitor, 0·005 mfd., in series, can be used where direct earthing is impra-

ticable. It is connected between the neutral and the chassis of the fitting and steps must be taken to ensure that the phase and neutral leads are correctly identified.

It is of little use proceeding with further tests until normal lamp temperature is established.

The object of the capacitor in the starter switch canister or the Quickstart unit is to suppress lamp interference waves. For the majority of cases, this is satisfactory, but in certain instances some additional suppression may be necessary. The method of testing is :—

With Starter Switches. Replace the existing switch by a new switch and note whether the interference is materially reduced. If there is a marked reduction, the suppression capacitor in the existing switch is inoperative. If additional suppression is still required, another capacitor may be placed across the switch, Fig. 1(b). The leads of the additional suppressor should be kept as short as possible.

With Quickstart Units. Connect a capacitor across terminals 1 and 4 as shown in Fig. 2(a). If this reduces the interference, the suppression capacitor within the unit is probably inoperative. If additional suppression is required, an additional capacitor may be used as in Fig. 2 (b.)

A fluorescent lamp sometimes creates more interference towards the end of its life, and a cure can then be effected only by fitting a new lamp. A temporary cure may sometimes be obtained by reversing the lamp in its holders.

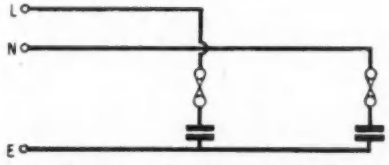


Fig. 3. Capacitors installed at the fuseboard, in this manner, will "clean up" the last traces of radio interference from fluorescent lighting units

Where mains interference is proved, fit a suppressor as shown in Fig. 1(c) to each troublesome fluorescent lighting fitting.

External Interference

In certain installations, it may be found that the fluorescent lamp is not the only cause of interference. The suppressors mentioned here are for such cases and suitable units are sold by most dealers. Units are specially made for the reduction of mains conducted interference caused by commutator motors, mercury arc rectifiers and similar apparatus.

These components can also be used to "clean-up" the last traces of radio interference from fluorescent lighting installations. In these cases the component will be fixed at the fuse or meter board and connected as in Fig. 3.

They usually comprise two capacitors in series with centre tap to earth, and are fitted with cartridge fuses.

An all-wave filter is also marketed which gives suppression from 10 to 2,000 metres and is affixed to the mains input of the radio set as shown in Fig. 4.

Additional Notes

(1) No single capacitor can possibly act as a suppressor for all radio wavelengths. The best that can be offered is freedom from interference on the B.B.C. stations.

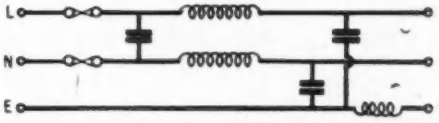


Fig. 4. Filters of this type will suppress mains interference in the wavelength range 10 to 2,000 m

(2) It is better to "prove" the installation before criticising the user's set and aerial.

(3) It is useless to attempt to deal with interference problems without test gear. A portable radio set, set of suppressors, spare lamp and starters and a voltmeter and ammeter are all essential.

(4) There is, as yet, no legal obligation to do more than ensure that the suppressor already fitted in the starter switch canister or the Quickstart unit is in good working order.

(5) It is undesirable that a glow-switch should have more than 0·02 mfd. in shunt with its contacts.

AMERICAN VIEWS

IMPORTANT achievements of the B.E.A. were commented on by the U.S. team visiting this country under the auspices of the Anglo-American Council on Productivity at a press conference last week.

They mentioned particularly the research being conducted into the causes of slugging of boilers with particular reference to chlorine and phosphorus. Methods of crack detection, using supersonic and radio-active tests were new to the team and they expressed appreciation of cable design and installation in which British practice was ahead. In reply to a question on the progress of district heating in U.S. it was stated that it was only used in New York and no extension was contemplated for the simple reason that it did not pay.

Welsh Hydro Bill Debated

Opposing technical arguments refuted in Commons

AFTER the failures of repeated attempts to secure an unopposed second reading for the Private Bill empowering the B.E.A. to construct hydro-electric schemes in North Wales, the House of Commons interrupted its proceedings last week for a three-hour debate on the subject. After Members had been satisfied by assurances as to the protection of amenities given by Mr. Geoffrey Lloyd, the Minister of Fuel and Power, the motion for second reading was carried by 200 votes to 40.

The second reading was moved by Mr. Gower (Barry), who recalled that the projects mentioned in the Bill were contemplated, before the industry was nationalised, by the North Wales Power Co. Involved were the extension of the catchment areas of existing schemes at Dolgarreg and Maentwrog, the construction of a new system near Ffestiniog, with three related generating stations and necessary ancilliary works. The proposals under review involved an average annual output of 84·5 m. units from a generating capacity of 45·5 MW. The average cost per kilowatt installed was estimated at £94 5s., and the overall cost per unit sent out would be about 6d. [presumably 0·6 pence is meant—ED.]. Coal saving is estimated at 55,000 tons/year. Life for the project was estimated at about 80 years, as against 25 years or steam plant.

Scheme Unjustified

Objections to the Bill in subsequent speeches were made on two grounds—technical and aesthetic. Leading the attack for the former reason was Mr. Nabarro (Kidderminster), who criticised principally on the grounds of capital cost. He preferred to consider the whole set of possible North Wales schemes, costing £40 m. for 300 MW. More economic, he suggested, would be the use of a transmission scheme to feed North Wales, based on the 180 MW Connah's Quay station, which should have its load factor increased from a planned 41% up to 80%. In support of this idea, he quoted Sir Patrick Abercrombie. He further questioned whether schemes would have a life of as long as 80 years, and he "denounced emphatically" the idea that the cost of a scheme would be as low as £94/kW. Finally, he suggested that the coal economy of the scheme was very small compared with its capital cost.

Another technical point, developed this time by Mr. Roberts (Caernarvon) dealt with the effect of abstraction of water, and questioned the assumption that there was a large supply of water in North Wales, at a high level, which was not now and never would be required for domestic and industrial consumption. The rainfall was high, but it could not readily be gathered into reservoirs.

Both these matters were dealt with by various members, who usually disagreed with the drawbacks suggested, but there was more general support for fears about the beauty of the countryside.

Ex-Minister's Support

Mr. Noel-Baker (Derby, South) intervened to support the second reading of the Bill, and also "specifically rejected" Mr. Nabarro's arguments. He believed that the three schemes proposed in the Bill were not open to serious objection on the grounds of beauty, and the National Parks Commission were understood to support this view. He came to the conclusion, however, when in office, that many of the other schemes should not be allowed.

Replying to the debate, the Minister of Fuel and Power explained that the B.E.A., as a nationalised industry, had not felt itself able to follow the normal practice of promotion of private Bills, and enter into negotiations with Members who had objections to the Bill. Dealing with Mr. Nabarro's points, he said that the Ffestiniog scheme was to cost £3,325,000, against £2,358,000 for an equivalent steam station. The running cost of the hydro scheme would be £21,000/year, against £265,000/year for the steam station. The only effect of increasing the load factor of the Connah's Quay station would be to supply electricity in the middle of the night, when no one wanted it. To him it seemed that the scheme as described in the Bill was perfectly businesslike.

To take care of the amenity problem, the Authority wished to incorporate the ordinary planning clause which was standard in all Private Bills. In addition, it was thought that it should be obligatory on the B.E.A. to consult the Royal Fine Arts Commission and the National Parks Commission, and to employ a landscape consultant. As regards water, it was suggested that the Committee which would deal with the Bill had sufficient powers.

STANDARDS FOR CABLES

B.S.I. coverage of this important field is reviewed in this article

By C. C. BARNES, A.M.I.E.E., A.I.I.A.

TODAY there are an increasing number of British Standards dealing with a variety of insulated electric cables, and the purpose of the following notes is to review the current position in respect to British Standard cable specifications.

The most important British Standard for paper-insulated, lead-sheathed and steel-armoured power cables is B.S. 480:1942, Dimensions of Paper Insulated Cables for Electricity Supply, which provides design data for belted, screened and S.L. type cables up to and including 22 kV. At the present time there is no British Standard for 33 kV screened solid type cables, and the time is now overdue for the inclusion of this important additional information in the next revision of B.S. 480.

Fig. 1 shows the variation in the dielectric thickness with conductor section for the range of cables to B.S. 480:1942. The gradual reduction in insulation thicknesses since the original British Engineering Standards Committee report on cables (1904) are shown in Fig. 2, overleaf.

Recent years have seen a steadily growing use of paper-insulated, lead-sheathed cables in mines, since they provide a very economical means of transmission due to the high permissible current rating compared with other types of power cables used for mining work (Fig. 3). B.S. 760 (Dimensions of Paper Insulated Cables for Use in Mines) was published in 1938 and revised and reissued under the same reference number in 1943, the principal differences in the latter specification being that the range of conductor sizes is reduced; design data has been omitted for twin cables operating at 3·3 kV and 6·6 kV; except for 0·0225 sq in. (multicore cables) all conductors are now shaped, and not circular. Certain armouring wire diameters have been withdrawn, and all 11 kV cables omitted.

Regulation 125 of the Coal Mines Act (1911) stipulates that all parts of an earthing system, including the lead sheath and armouring of a cable where this is connected to the earth system, are required to have a conductivity at all parts and at all joints at least equal to 50% of that of the largest conductor used solely to supply the apparatus concerned.

This requirement operates throughout the electrical system with the exception of certain very small flexible cables used in conjunction with portable lamps, and also for the case of single-core armoured cables where the con-

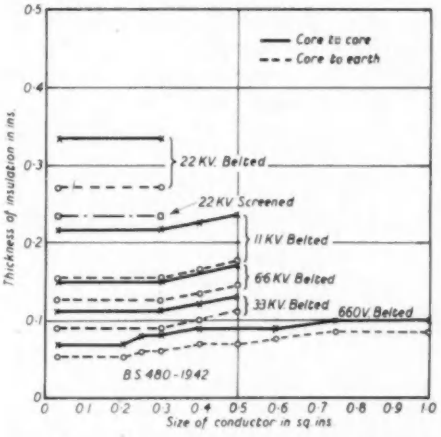


Fig. 1. Dielectric thickness varies only slightly with conductor cross-section, as this diagram shows

ductance (reciprocal of the resistance measured in "reciprocal ohms" or mhos) of the armour of each cable must be at least 25% of the enclosed conductor. Furthermore, the earth conductor must be continuous in that no switch, fuse or circuit-breaker is inserted therein. Clause 14 of B.S. 760:1943 states: "Where the conductance required under Regulation 129 of the Coal Mines Act cannot be obtained by the use of galvanised steel wire of the specified size, the required value may be obtained by the insertion in the armour of hard drawn tinned-copper wire, or wires of a size not smaller than that of the galvanised steel wire." For the purpose of calculating the conductance of the metallic coverings, the resistivity of galvanised steel armour shall be taken as eight times and of lead as twelve and a half times that of standard annealed copper.

B.S. 883:1949 covers the range of paper, varnished cambric, vulcanised rubber and thermoplastic insulated cables for the electrical equipment of ships.

Varnished Cambric Cables

Interest in varnished cambric as a cable insulation has developed appreciably in recent years. The advantages that v.c. cables offer are derived from the following considerations. (1) There is no fluid insulating compound to cause drainage or impregnation troubles.

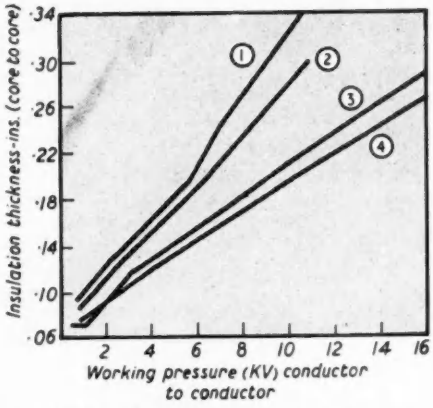


Fig. 2. Dielectric thicknesses core to core for paper insulated cables as given in successive British Standards 1:1910, 2:1919 and 1926, 3:1933, and, most recent of all, 4:1942

(2) The v.c. insulation is moisture resisting, although not completely moisture-proof. It is, however, more impervious to moisture than paper, and under favourable conditions it may be protected with an overall braiding instead of the metallic sheath required for paper-insulated cables. (3) The maximum permissible operating temperature is relatively high, being 70° C for all cables up to 11 kV working pressure, excluding twin- and multi-core belted-type cables for 11 kV, for which it is 65° C. This is the same as for paper-insulated cables and compares with 49° C for rubber-insulated cables. (4) The current carrying capacity is sometimes the same and in other cases only slightly less (depending on the service voltage) than for similar paper-insulated cables and identical conditions of installation. Rubber-insulated cables have a considerably lower current carrying capacity. (5) V.C. cables may be used for internal wiring where it is not desired to employ terminating boxes—when used out of doors adequate protection (such as terminal boxes) is essential.

Thus v.c. cables have advantages for internal wiring, rising mains in large buildings, such as blocks of flats and hospitals, for use in power and substation cabling, for motor, transformer and switchgear connections, and for marine installations where ambient temperatures are often high and ease of termination is an essential requirement.

In general, lead-covered v.c.-insulated cables are more expensive than the lead-covered paper-insulated type, but they show a fair saving when compared with lead-covered rubber or p.v.c.-insulated cables.

Prior to the publication of B.S. 608:1935 (revised and reissued in 1943) there has been no British Standard for v.c.-insulated cables, but the general tendency seems to have been to adopt the same thickness of insulation and lead as were specified for paper-insulated cables in B.S. 7:1926 (which is now obsolete).

B.S. 608:1943 (Dimensions and Testing of Varnished Cambric Cables for Electricity Supply) recommends insulation and lead wall thicknesses for the normal range of v.c.-insulated cables, and an important addition to this specification (when compared to the earlier issue B.S. 608:1935) is Table No. 7, which provides design data and dimensions for taped braided and compounded cables up to and including 11 kV.

V.C.-insulated cables, due to the nature of the insulating material used and the manufacturing processes involved, tend to have a higher power factor and ionisation than impregnated paper-insulated power cables. Thus the voltage range with this type of dielectric is restricted in B.S. 608 to a maximum service voltage of 11 kV.

V.B. and Jute Cables

Impregnated jute cables were largely employed in the early days of cable-making, but there is very little impregnated jute cable manufactured today. Nevertheless, it has been included in B.S. specifications and was included in B.S. 7:1926 on the same basis with respect to dielectric thicknesses, and it is still recognised as a definite type of insulation in B.S. 1216.

The special advantages of vulcanised bitumen insulated cables are lightness in weight, proof against damp and resistance to chemical action, properties particularly suitable for use in mine shafts and underground roadways. Paper-insulated vulcanised bitumen sheathed cables have also been used for some installations, since they are considerably lighter than the standard impregnated paper-insulated cables sheathed with a solid tube of lead.

The present position of British Standards for both types of v.b. cables referred to above is uncertain since B.S. 7:1926, which gives design data for these cables, has been superseded by later specifications, viz. B.S. 480:1942

for Paper Insulated Cables and B.S. 7:1946 for Rubber and Thermoplastic Insulated Cables, but these revised specifications do not provide design data for bitumen-insulated and/or sheathed cables. Today the demand is negligible for this type of cable. This is probably due, however, to the very low conductor temperature permitted (normally of the order of 100° F) in order to avoid any tendency for the conductors to become decentralised in service.

V.R.I. Cables

Vulcanised rubber-insulated cables are mainly used for the wiring of buildings, factories, houses, etc., for low power work and the requirements for these cables are fully detailed in B.S. 7:1946 (now being revised).

Despite the many technical advances in the development and processing of rubber dielectrics, there has been no alteration whatsoever in the radial thicknesses specified for low voltage rubber-insulated cables since the original standards for rubber-insulated cables were published in 1904. This lack of progress is remarkable when compared with the progressive reductions that have been made in the case of paper-insulated cables; thus ample scope appears possible for reconsideration of v.r. insulation thicknesses in view of the economies and material savings which can result from detailed study of the position.

Owing to their comparatively high cost and low current rating, v.r. cables are not used to any extent for the general supply of power.

B.S. 708:1950 (Trailing Cables for Mining Purposes) covers six designs of v.r.-insulated flexible trailing cables for use with coal cutters and three designs of pliable armoured conveyor cables; in addition four types of trailing cables for use with drills are also included in B.S. 708. In order to ensure a high degree of flexibility the conductors for trailing cables are built up from fine wire as shown in Table 1.

TABLE 1.—FLEXIBLE CONDUCTORS FOR TRAILING CABLES

Usage	Nominal cross-sectional area of conductor sq in.	No. and diameter of wires	Continuous current rating amps
Coal cutter cables	0·0225	91/·018	39*
	0·03	117/·018	46*
	0·04	163/·018	55*
Conveyor cables	0·01	97/·012	27
	0·0145	60/·018	32
	0·0225	91/·018	39
	0·03	117/·018	46
	0·04	163/·018	55
	0·06	248/·018	71
Drill cables	0·007	162/·0076	20
	0·01	140/·010	27

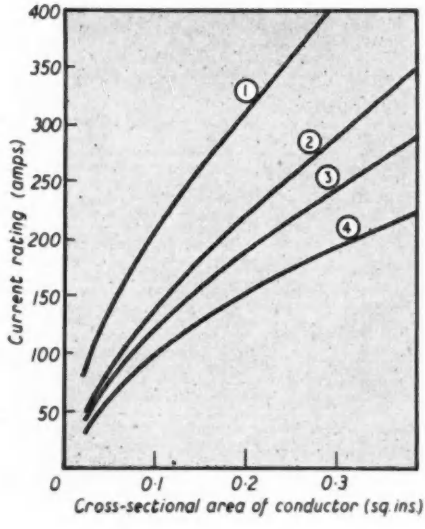
* *For flexible trailing cables used on d.c. systems (Types 1 and 13 of B.S. 708:1950) these ratings are increased to 45, 52 and 62 amps respectively.*

The current ratings tabulated above are based on a maximum ambient air temperature of 90° F (32·2° C) and a temperature rise of the conductor of 30° F (16·7° C), i.e maximum conductor temperature of 120° F (48·9° C).

The above temperature limits are in line with the recommendations for v.r. cables in the I.E.E. Regulations for the Electrical Equipment of Buildings (12th edition). In this country higher temperatures for v.r.-insulated cables are not recommended in order to avoid impairing the life of the dielectric.

The radial thickness of v.r. insulation for coal cutter and conveyor cables is in line with B.S. 7 specification for 660 V working pressure, but for drill cables the service voltage is only of the order of 125 V and therefore the B.S. 7:1946 thickness of insulation for 250 V working pressure is used.

Fig. 3. Permissible current loading of 3 core mining cables in air-ambient temperature 80° F. 1 - 3 core p.i.l.c. and wire armoured, 3·3kV; 2-compound insulated and sheathed w.a., 660 V and 3·3kV; 3 - p.i. vulcanised bitumen sheathed w.a., 660 V and 3·3kV; 4 - vulcanised-bitumen insulated and sheathed, w.a. 660 V and 3·3kV



Thermoplastic Insulated Cables

Prior to 1928 gutta percha was the best example of plastic insulation used in the cable industry, but continual researches were being carried out to improve on natural materials;

1935 marked the advent of long chain polymers, and from then onwards intensive development finally led to the present types of thermoplastic-insulated cables. Thermoplastic materials and, in particular, polyvinyl chloride (p.v.c.) had been developed before the last war, but mainly on an experimental basis.

In respect to mechanical strength and general electrical characteristics p.v.c. is somewhat inferior to v.r., and being a thermoplastic material its resistance to heat is poor. P.V.C. cables can be used, however, in many situations where v.r. cables require additional protection against oil or other deleterious influences. Amendments have now been issued to B.S. 7 (1946) and various other Standard specifications for v.r.-insulated cables permitting the use of p.v.c. cables as an alternative type to v.r.-insulated cables for copper sections up to and including 19/·064 conductors (0·06 sq in.). Standard p.v.c. insulating and sheathing compounds are detailed in Governmental Departmental Electrical Spec. No. 18.

Another important synthetic thermoplastic material is Polythene, also referred to by the chemical name Polyethylene. During the war Polythene was widely used for radar cables, and today it is clearly recognised that the British development of radar proved to be one of the greatest single contributory factors to victory, and this achievement depended almost entirely on the unique electrical properties of Polythene.

For the electrification of domestic and industrial buildings Polythene-insulated cables do not compete to any great extent with the well-tried and proved v.r. dielectric, but a British Standard has been issued to cater for the limited demand for such cables, viz. B.S. 1557:1949, Polythene Insulated Cables Sheathed with Polyvinyl Chloride (P.V.C.) or Lead Alloy.

Lead and Lead Alloy Sheaths for Cables

Oil impregnated paper is inherently hygroscopic, and it is therefore necessary to apply a moisture-resisting sheath over the insulated cores. Lead and lead alloys are the most convenient materials for sheathing electric

TABLE 2.—LEAD AND LEAD ALLOYS FOR SHEATHING CABLES

Lead or lead alloy	Composition (percentage by weight)						Load including impurities	Character	*Endurance limit tons p.s.i. (lb p.s.i.)	Remarks
	Tin		Antimony		Cadmium					
	min.	max.	min.	max.	min.	max.				
Pure lead	—	—	—	—	—	—	—	Very pliable	± 0·18 (± 403·2)	For particular application where a very pliable sheath is required and poor fatigue resistance may be tolerated
A	1·8	2·2	—	—	—	—	97·8 to 98·2%	Hard	± 0·40 (± 896·0)	For house and ship wiring. It is resistant to abrasion and does not age harden. Has been largely superseded by alloy E
B	—	—	0·8	0·9	—	—	99·1 to 99·2%	Hard	± 0·6 (± 1,344·0)	This is an economical alloy very much used for cable sheaths—it is fairly soft after extrusion, but develops considerable hardness on ageing. It is used for power and aerial cables and positions where vibration is serious
C	0·35	0·45	—	—	0·12	0·18	99·37 to 99·53%	Soft	± 0·35 (± 784·0)	This alloy was preferred by the Admiralty for ship wiring and is easier to install than B. It has a high fatigue resistance and remains permanently soft
D	—	—	0·45	0·55	0·2	0·3	99·15 to 99·35%	Very hard	± 0·74 (± 1,657·6)	For use where vibration is severe and persistent. It has a high fatigue resistance and age hardens. Its stiffness precludes its use where ductility is important
E	0·35	0·45	0·15	0·25	—	—	99·3 to 99·5%	Soft	± 0·41 (± 918·4)	A wartime substitute for alloys A and C which is now tending to be used as a permanent alternative to these two alloys

* Taken as the range of stress which will cause failure after 10 million reversals.

TABLE 3.—BRITISH STANDARD SPECIFICATIONS FOR ELECTRIC CABLES

British Standard (number and year and issue)	Title	Voltage range
B.S. 7:1946 (under revision)	Rubber Insulated Cables and Flexible Cords for Electric Power and Lighting (also supplement relating to p.v.c. cables)	250V to 11 kV (inclusive)
B.S. 443:1939	Testing of Zinc Coating on Galvanised Wires	
B.S. 480:1942	Paper Insulated Cables for Electricity Supply	660 V to 22 kV earthed type (additional tables for 3·3 to 11 kV unearthed-type cables)
B.S. 608:1943	Varnished Cambric Cables for Electricity Supply	660 V to 11 kV earthed type only
B.S. 708:1950	Trailing Cables for Mining Purposes	250 V and 660 V
B.S. 760:1943	Paper Insulated Cables for Use in Mines	660 V to 6·6 kV earthed and unearthed types
B.S. 801:1938 (under revision)	Lead and Lead Alloys for Cable Sheathing	
B.S. 883:1949	Cables and Flexible Cords for Electrical Equipment of Ships	660 V to 6·6 kV paper cables, 660 V to 6·6 kV v.c. cables. Also range of v.r. and p.v.c. insulated cables and mineral-insulated cables
B.S. 937:1940	Flexible Cords for Miners' Cap Lamps	
B.S. 1116:1943	Flexible Trailing Cables for Quarries and Metalliferous Mines	660 V and 3·3 kV
B.S. 1216:1945	Jute Insulated Cables for Electricity Supply	660 V only
B.S. 1441:1948 (under revision)	Galvanised High Tensile Steel Wire for Armouring Submarine Cables	
B.S. 1442:1948 (under revision)	Galvanised Mild Steel Wire for Armouring Cables	

cables because of their ease and high speed of application, pliability in facilitating installation and relative immunity from corrosion in a variety of media.

The so-called "pure lead" cable sheaths (which contain other materials in small quantities) are liable to failure in service by a specific form of cracking, and careful metallurgical examination has revealed that these cracks pass along the boundaries of the crystals from which the lead sheath is composed. This type of cracking has been found to be due to one or both of two main causes, i.e. vibration and/or inter-crystalline corrosion.

The drawback of extreme mechanical weakness and tendency to creep under very small stresses has been surmounted to a considerable extent by the addition of other elements to lead, thereby forming binary or ternary lead alloys. Details of the normal range of lead alloys recommended for sheathing cables are given in B.S. 801:1938 and summarised in Table 2.

At the present time only two lead alloys, which are reasonably easy to extrude and have a good service record, are used for cable sheaths, viz. alloys "B" and "E," the latter alloy being widely adopted. This tendency is a progressive step, since the use of one, or at the most two, lead alloys in the factory greatly assists production, because when a lead press has to be changed over from one alloy to another several charges have to be run out before useful extrusion of the different alloy can be commenced and, furthermore, this tendency reduces factory costs.

Standard System Voltages

Standard voltages are now specified in B.S. 77:1947. The present standard system voltages up to 33 kV are as follows:—

Voltage to neutral *240;* voltage between lines *415*, 3,300, 6,600, *11,000*, 15,000, 22,000, *33,000*. The voltages in italics are primary standards (i.e. the preferred voltage).

B.S. 7 and certain other British Standards still refer to 660 V, but this phraseology is a legacy from the past. It will be a logical modification, therefore, if the existing reference in cable standards to 660 V and 250 V are changed to 415 V and 240 V respectively, as recommended in B.S. 77:1947.

Table 3 summarises current British Standards dealing with cables.

HEATING
in an *ALL ELECTRIC HOUSE*
I.E.E. Paper advocates floor heaters and improved thermal insulation

DISCUSSION of the conflicting considerations which apply to the use of electricity for domestic heating moved to a new quarter on Thursday last, when MR. D. H. PARRY, B.SC., M.I.E.E. (East Midlands E.B.), read a paper to the Institution of Electrical Engineers entitled "The Logical Approach to the Problems of Space Warming by Electricity." The author's approach is to discuss the means by which the persistent public demand for electric heat can be met without excessive load on generating plant, or heavy coal consumption.

Mr. Parry begins with a brief review of the relevant parts of the Egerton and Simon Reports, which, while pointing out the need to reduce heat losses from buildings, "pinned their faith to improving the efficiency of fuel burning appliances." They tended to treat electricity as a very expensive fuel. On the figures quoted in the reports, and with the problem of generating plant shortage also in mind, it may seem fantastic to contemplate the use of electricity in substitution for the combustion of ordinary solid fuel. Three good reasons exist for doing so : first, the substitution is already becoming a fact; secondly, if electricity is properly used for space warming the coal economy need not be worse, and may even become better; and thirdly, space warming by electricity can be provided without excessive demand at time of peak load.

District heating is dismissed in the paper as entailing high capital charges and heavy thermal losses when applied to modern estates of from 10 to 15 houses to the acre. It is considered that unless there is a change from present housing policy, there appears to be no future for the system.

Coal Available

Because of the increased proportion of low-grade slacks to be expected from coal mines as a result of the exhaustion of thick seams and increased mechanical mining, a considerable expansion in the use of coal for electric heating can be expected without economic embarrassment. The position with regard to peak load demand is rather different. From measurements taken in Leicester it is suggested that the heating load is growing at a faster rate than other loads. It is noteworthy that the average electrical heating load, related to temperature, of modern houses built to Egerton Report standards and equipped with modern high-efficiency solid-fuel appliances has been found higher than the average for the whole city.

Heating Dwellings

The basic problem of heating dwellings is presented in the paper as that of conditioning the dwelling so that heat rejected from the human body is removed at the optimum rate. Normal losses from a house comprise heat conducted through the fabric and heat lost in ventilation air. In this respect it has to be remembered that a system of heating may be effective, but thermally inefficient. An example of this is given by a convector placed under a window, which effectively improves comfort, but from the efficiency viewpoint has excessive heat loss through the window.

Much greater study is needed on how to secure effective heat distribution in a living room. It is generally agreed that the mean wall-surface temperature should be 3°F higher than the air temperature, and that the temperature at floor level should be somewhat higher than at head level. High-temperature radiation is very efficacious for distributing heat to walls and air. Heating by solid-fuel stoves usually means that the greater part of the heat is given to the air; the walls are heated by the air, and are therefore several degrees lower in temperature even with continuous heating. Moreover, the ceiling becomes the warmest part of the room, which is also undesirable. Central heating is essentially inefficient in small, lightly constructed buildings and in countries where temperatures fluctuate.

Thermal insulation of houses, it is suggested, should be taken to a higher level than the Egerton report recommends. This is because with electric heating, chimneys can be omitted, and excessive ventilation thus reduced. Fan ventilation, possibly associated with a system of heat recovery, can be adopted if necessary. A thermal transmission coefficient (U) of 0·075 B.Th.U./hr-ft²/°F is suggested as a reasonable target; half the Egerton recommendation.

Both Egerton and Simon reports recommend some system of "topping up" continuous heating, using gas or electric heaters. In the interest

of the electricity supply industry, it would be better for electricity to take the background heating and for solid fuel to be used in emergency. The fact that solid fuel, unlike electricity, can be conveniently stored supports this idea. Another difficulty with the use of solid fuel for background heating is that stoves in modern houses may be designed to avoid overheating in mild weather, and will thus be too small to maintain comfort in severe weather. The deficiency will then have to be met by electric heating at the time of peak demand. If the main heating load were carried by electricity, well-fitting doors would be fitted to chimneys to keep down ventilation losses when no fire is required.

Electric Heating

The simple bar type of electric heater emits only 55% of its heat by radiation, and the reflector type only 70%; the remainder (emitted as convected heat) is of little value for short time heating. Where long time heating is used, the convected heat is wasted if the fire stands at the foot of a chimney, while if on the other hand the air is brought into the room, there is sometimes an objectionable smell of burnt dust. There is thus scope for more efficient high temperature radiators, perhaps having a vacuum tube enclosing an infra-red element, and mounted at picture rail level. The radiation will not burn dust, and it will penetrate air with little convection loss. Lamp manufacturers, it is considered, should be encouraged to develop this kind of heating for the home.

Electrical convectors of various forms have become popular in recent years, but they are suitable only for continuous heating, and their efficiency is less than that of properly designed radiant heating. Low temperature radiant heating can, if carefully designed, be the most efficient form of space warming. Ceiling, wall or floor may house low-temperature heating panels. Floor heating has special advantages here. Thermostatic control is an essential feature, and gives very satisfactory results. The heat pump, which suggests itself as a way of obtaining cheap heat with the aid of electricity, is likely to be too expensive in first cost.

It is suggested that in the past electrical engineers have been too diffident in demanding from architects low-heat loss houses, or in demonstrating how electric heating may be used with minimum loss. To some extent this is a matter of selecting good sites, but helpful methods of construction are also well-established. The heating equipment suggested for an all-electric house is : one emergency open coal fire in the living room; main heating by low-temperature radiation in floor of living room; "comfort" or "personal" heating by high-temperature radiant heaters (infra-red types) in other rooms if desired; controlled fan-ventilation, with heat regeneration, circulating through ducting in all rooms.

Floor Heating

Floor heating is recommended on the basis of good heat insulation (U not less than 0·10), to give a floor temperature not exceeding 70°F, with wall and ceiling temperatures of 60-65°F under all winter conditions. The demand from this type of heating would be about 1·5 kW continuously in cold weather. The heating elements could be switched off for several hours without noticeable fall in temperature, and thus time-switch control should be possible.

Since the system of ventilation and heat recovery suggested in the paper has not been investigated by any research association an impartial study of their possibilities is desirable as a corollary to the expenditure of large sums of money on thermal insulation.

The all-electric house built to Egerton Report standards of comfort would, it is suggested, require only 2·5 tons/coal annually against 2·75 tons coal or coke if solid fuel were used. This assumes U = 0·075. Cleaner air would be an extra benefit. The cost of the house might be raised by £250, or a yearly rent increase of £9. When the extra cost of electricity is added, the total higher weekly cost is 4s. 1d. There is a case for a higher subsidy to offset some of this cost, because of the reduced atmospheric pollution, and the saving to local authorities of the cost of handling ashes.

Conclusions

In his conclusion, after estimating the effects of all-electric houses on electricity boards and generating stations, the author goes on to suggest that to influence Government departments, architects, etc., the electricity supply industry should arrange for experimental houses of different insulation standards to be built, and tested against similar houses using solid fuel.

As a short term measure reflector-type high-temperature radiators should be recommended in preference to the simple bar type, appropriate internal decorations should be used, with the application of aluminium foil in roofs. Panels should close up fireplaces when substituting electric fires, and concrete for new floors substituted for wooden floors.

DISCUSSION

PROFESSOR F. E. SIMON (Clarendon Laboratories) welcomed the opportunity of discussion of a subject on which he stood on the opposite side to the author. He thought that district heating with the use of back-pressure turbines, and the heat pump used with low temperature radiant heating panels were both preferable to electrical methods of heating. His main objection to electric heating was concern at its effect on the load curve: he thought shift work would have to be introduced in industry to spread the industrial load, and did not want the position made worse. Electricity boards should realise that they produced energy in two forms—as electric power and as low temperature heat. They should try to use the latter instead of rejecting it. He appealed to the industry not to regard someone who disliked electric heating as an enemy of the electrical industry.

MR. FORBES JACKSON (L.C.C.) thought the paper was timely because of the many attacks on electric heating made in the past few years and left unanswered by the supply industry. The position had arrived when, because of government influence, electricity boards no longer dared to accept loads that they knew they needed to improve both their finances and their load curve. "Let us," said Mr. Jackson, "get back into saying what we think about these matters." He thought that offices and converted old houses were the real culprits in load troubles, rather than the all-electric house. Promotional tariffs were needed to encourage loads at the right times.

MR. SHAW (Building Research Station) explained that the test bed efficiencies so often quoted in arguments about domestic heating could only be used in comparing similar types of appliance, and not for comparing, say, open fires with closed stoves. The test bed efficiency measured only the principal source of heat (radiation *or* convection). This quoted efficiency when converted to a room heating efficiency might have to be lowered for the effect of excess air, and raised for the effects of the minor process of heating.

MR. R. H. RAWLL (L.E.B.) recalled Dr. Ferranti's address on the all-electric life when the lecture theatre was first used, noting especially that he said that electric heating would be largely applied by storage methods. He appealed to all members of the profession to forward this idea; at the moment the industry was taking things lying down.

DR. WESTON (Building Research Station) vigorously attacked the arguments in the paper, basing his criticism on the author's comparison of central heating and electric heating. He attacked particularly the basis of ventilation assumed. In spite of all that was said in the paper, the conclusion of the Simon committee that solid fuel must take the basic heating load remained valid.

MR. J. I. BERNARD (E.D.A.) said that personally he agreed with all that the author had to say in his opening remarks. He noted that over a period when domestic coal consumption had been reduced by 15m tons/year, coal used for domestic heating and cooking by electricity increased by only 4m tons/year. He felt that no more restriction was necessary on heating methods than the duty imposed on nationalised bodies to pay their way.

MISS GRIFFITH (E.R.A.) described experiments with floor heating, and emphasised how important was good thermal insulation in making this successful. Thermostatic control should be applied, and the thermostat should be freely suspended in the air. In effect, with floor heating available kWh were traded for scarce kW. Galvanised iron run in concrete provided cheap and effective heating elements, and the storage characteristics were very good.

Speaking of the outlook for heat pumps, she said that more finance was needed for research. A cheaper source of heat was also required, and here the use of sewers, which were often steaming, deserved consideration.

MR. J. L. RYCROFT (G.E.C.) agreed with the author that adequate insulation should be encouraged, but doubted whether the building construction suggested could be justified. Under present conditions, he thought that background heating would have to be taken by solid fuel.

The overall combination would give an economic revenue to the supply industry. From a coal economy point of view it was evident that electricity was better than solid fuel for heating rooms occupied only intermittently, while for water heating in the summer, when the solid fuel boiler was unwanted and might be a nuisance in the house, electricity used less coal than the boiler for a service giving up to 200 galls. of water a week.

MR. P. SCHILLER (B.E.A.) was certain that electricity should be used for cooking and water heating, but had not been able to convince himself that the same was true of all-electric space heating. He supported his doubts with references to degree-day diagrams, emphasising the big day-to-day variation in power generation that would often be necessary. He did, however, support the author in his request for full scale trials. National fuel policy was in danger of being decided on the basis of unproved hypotheses. In connection with some of the statements made by Dr. Weston, he thought it was necessary to differentiate useful heat from the total output of an appliance.

MR. MARGOLIS (Kennedy and Donkin) spoke of the advantages of district heating in association with back pressure generation, and claimed that the cost nowadays of a heat-generating station was less than for a full condensing station.

MR. H. M. ACKERY (E.D.A.) suggested that an awkward feature of electric floor heating was its habit of not producing the conditions that the designer wanted. The only stable thing about it was the amount of energy put in; the surface temperature, the air temperature and so on would be decided by the characteristics of the room.

Mr. L. G. Bolton and Mr. R. E. Gamlen also took part in the discussion, to which the Author briefly replied.

Progress at Lime Grove

More Studio Space Available for Television

SINCE early in 1950, when the B.B.C. acquired the studios at Lime Grove for television purposes, considerable progress has been made in reconstructing these for their new function. The premises contain five studios, "D," "E," "F," "G" and "H"—"A" and "B" being located at Alexandra Palace.

Studio D, with an area of 5,400 sq ft, came into operation first for the children's programmes, but has now been taken over by the Drama Department. It is equipped with three studio cameras, by E.M.I., and a telecine channel is provided to enable film sequences to be inserted into productions where necessary. The sound equipment comprises six microphones, four gramophone outputs for musical and sound effects, a telecine sound channel, and two microphone booms on the studio floor.

Lighting up to 120 kW is available, but because of the high camera sensitivity is it seldom necessary to use more than 75 kW.

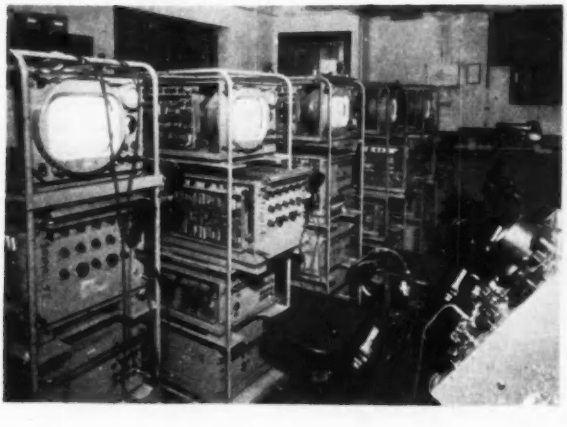
Studio G, which came into operation in December 1950, has a floor area of 6,000 sq ft. This is equipped with vision apparatus made by Pye Ltd., and has four studio cameras. B.B.C. type "A" studio sound equipment is provided —catering for six studio microphones, four gramophone outputs, and one film sound-track channel. Separate sound and vision control rooms, separated by a power-operated glass window, are used here. Approximately 250 kW of lighting is available, and in practice loadings of over 200 kW are not uncommon. An unusual feature of this studio is the air-conditioning plant, which provides clean, hot or cold air as required. The chilled water for cooling the air comes from a steam-heated absorption type refrigerator.

Latest of the studios to come into operation is Studio H, equipped with apparatus made by E.M.I. Again B.B.C. type "A"sound equipment is used, to give six microphone channels, four gramophone outputs and a film sound channel. In this case, however, the control room is arranged to give a frontal view of the studio floor. Between the studio and control room a sheet of tinted glass is interposed to give a reduced direct vision light level comparable with that seen on the monitor tubes. Vision control is facilitated by the use of a new mixer and cutter unit permitting superimposition of two camera outputs.

Power Supplies

The d.c. supplies for the studios are provided by four 125 kW and two 250 kW m.g. sets, delivering 115 V power for the lighting load. The motors of these machines are 415 V 3-phase units. Supply is taken from the Area Board's 6·6 kV a.c. network over duplicate feeders via 1,500 kVA step-down transformers.

Development of the premises is still proceeding. By the end of the year it is hoped to have three 35 mm telefilm recording channels, and later, Studio "E" equipped with four Marconi Image Orthicon camera channels, will be brought into service, adding a further 4,800 sq ft to the production area. This will be followed by the provision of a central telecine suite consisting of seven 35 mm and five 16 mm channels. A new central presentation suite, a separate control room for rehearsals and a new Central Apparatus room will also be established.



The apparatus room for Studio H showing three C.P.S. Emitron camera control units and the vision mixer unit in the centre. The unit extreme left is the control for the telecine channel

Problems and Practice IN ENGINEERING

Thermostat Controlled Iron

THE iron in question was brought to me with the familiar, "There cannot be much the matter with it," and "It gets hot but will not hold its heat."

Before dismantling for repair I put it on test to discover the symptoms of the fault; the pilot lamp lit and the iron heated to the pre-set temperature and cut off. So far so good. I waited for the pilot lamp to come on again as the iron's temperature fell; when after 15 minutes it was still off I began to get anxious, checked the supply; that was still on. I removed the plug to inspect the pins and then replaced it in the socket; the pilot lamp lit. Then followed the same sequence of events as already described, and after half an hour the temperature was down to 90°; I did not carry the experiment any further, although now I wish I had: it would have been interesting to verify the logical conclusion that eventually the iron would have returned to ambient temperature, while controlled by the thermostat. After taking the cover off the iron, and carefully watching the operation of the thermostat contacts, I discovered that as the iron cooled and the contacts touched, a tiny but rather prolonged arc occurred and immediately the contacts separated again. This cycle of events recurred every ten seconds or so. Measuring the resistance across the contacts at the instant of closing I got three ohms. The contacts were not badly pitted or burnt, but were minus silver at the point of contact. After fitting new contacts the iron worked perfectly.

My theory is that the arc generated sufficient heat to affect adversely the normal operation of the compound bar.—*G. W. Eaton.*

Simple Soldering Outfit

IN going around on instrument and meter maintenance work, the need for a means with which to solder soon becomes pressing. There is nowadays an astonishing range in electric irons of many weights, voltages and shapes. Not for a moment would one decry carrying one or more of such irons if there can be certainty of a supply point at a suitable voltage : the maintenance man having a car or a van can indeed fit himself up for almost any emergency or condition.

But, for all that, some kind of self-contained soldering outfit should be in the kit. Mine consists of a light iron having a copper bit 1 in. long by ¼ in. diam.; a triangular clip fits on the stalk near the bit and acts as a stand about 1 in. high for that end; and there is a small stout circular metal tin, with metal cap, containing methylated spirit, and a coil of cored solder.

The cap of the meths. container holds ample spirit for a couple of heats, and a biggish job can be tackled by keeping the flame around the bit during the soldering process. An "unpepped" meths. flame is surprisingly hot, and with resin flux makes for clean working.

Well, that is my unpretentious and effective little outfit. It has raised many smiles over the years and failed me only once on site—I was down a gassy mine, but I took the faulty part to "bank" and the soldering outfit did its duty there without danger.—*G.E.M.*

Lift Controllers

SEEING that 90 per cent. of the operating trouble with electric lifts originate in the controller, it is strange that such controllers are so often mounted at the top of the shaft adjacent to the motor and driving gear. In many factories and buildings this position is very difficult of access; the electrical maintenance man haunts the ground floor, and time is lost when a lift fails through a controller fault. This difficulty was peculiarly acute in the case of lifts under the writer's care, and was overcome by bringing the controllers down to ground level at the foot of the lift shaft. Open-type controllers were installed, and light blocks for the purpose of lifting the cover off were provided by utilising ordinary arc lamp winches. Locating a controller on the ground admittedly means a long vertical run of main and control leads, but the extra cost of this is more than offset by the saving in time when a fault occurs, and by the fact that controller troubles can be better located and remedied on the ground floor than in a confined space and stuffy atmosphere.—*H. C. W.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

Convention on CONTACTS

I.E.E. East Midlands Centre Stages 3-day Symposium at Loughborough

ORGANISED by the Institution of Electrical Engineers East Midlands Centre, the convention on contacts which was held at Loughborough College on Monday, Tuesday and Wednesday of this week was no local affair, but attracted papers and attendance from all over the country. The convention was opened on Monday morning by Mr. A. W. Hirst, this year's chairman of the Centre. After appropriate remarks, he handed over to Dr. W. G. Radley, a vice-president of the I.E.E., who formally opened the convention proper. Thereafter, the convention was divided into two parts. The first, which filled Monday afternoon and evening and Tuesday morning, was concerned with light duty contacts in theory and practice; the second with heavy-duty contacts.

At the time of going to press, we are unable to give a full report of the proceedings; in the columns below we summarise briefly the papers that were presented.

Heavy-Duty Contacts

Mr. H. W. Baxter, of the Electrical Research Association, opened the heavy-duty section of the convention with a statement on present knowledge and the need for research. He classified as "heavy duty" those contacts which operated with significant amounts of arcing, loss of weight marking material transfer. Current ratings of individual contacts extend from a few amp up to about 300 amp.

Much of this paper is concerned with contact wear, and it is stated that for materials such as copper and silver, the loss in weight of the contacts for a given number of operations is substantially independent of the frequency of operation over a wide range (up to 2,000 operations/hour). Some materials, such as those of tungsten-silver and tungsten-copper mixtures, show rates of wear which increase at the lower rates of operation. Power factor has a marked effect on contact wear, since a low power factor tends to increase the duration of the arc, and so, usually, the contact wear, though the problem is not yet fully resolved.

The life of a contact depends very much on the correct choice of material; the present aim seems to be to produce a material which has the conductivity of silver combined with the hardness and non-tarnishing properties of tungsten. There is some doubt in this, however, as to whether hardness is necessarily a desirable quality. A point that has to be watched is that the life of contactor contacts is substantially reduced if they are operated in oil.

Contactor design influences wear in many ways. Because contacts are elastic, a high contact velocity means considerable bounce, and this may result in heavier wear at make than at break, especially in motor control applications. The action of blow-out coils may make matters worse in this way. In relation to blow-out coils generally, a careful balance is needed between their actions on increasing both breaking capacity and contact wear.

A somewhat lighter type of contact was considered by Dr. R. W. Sillars (Metropolitan-Vickers) who dealt with arc suppression at contacts interrupting medium currents, between 0·2 and 20 amp. In this range suppression of the over-voltage has little effect on the duration of the arc, because the arc voltage remains quite low until near the end. For this reason forcible interruption of the arc is required, and this is liable to produce large over-voltages which must be controlled to protect insulation and minimise re-sparking between contacts as they are opening.

Effect of Capacitor

A capacitor across the arc makes it unstable, and so produces forcible interruption, only when the capacitor is large enough for the current concerned. The capacitance required is found to vary approximately as the square of the current, and is independent of other circuit conditions. Frequently a capacitor which is large enough to make the arc unstable is not large enough to limit to a reasonable value the over-voltage resulting from sudden interruption of the current. In such cases, either the capacitance must be increased to a value which depends on the circuit inductance, the rapidity of separation of the contacts and the permissible over-voltage, as well as in the current, or a separate over-voltage suppressor must be used. The latter method is often the more economical.

Completely sparkless interruption is possible if current, capacitance, and rapidity of contact

separation are suitably related. The conditions for this to be so can be calculated and verified experimentally.

Amongst the other papers presented to the heavy duty section of the convention was one by Messrs. T. H. Cook and M. Vaughan (Morgan Crucible) which deals with some methods of improving brush contact efficiency, and their influence on machine performance. This particular paper is of special interest in that it reported the results of newly completed investigations. The basic phenomenon considered is the appreciable difference often noticed between the mean effective arc of contact between a carbon brush and a commutator, and the arc apparently covered. In the paper the part that staggering the brushes and the use of split and tandem brushes can play in solving this problem, is discussed.

A general paper on contactor contacts presented by Dr. W. Wilson (G.E.C.) includes a review of many aspects of design, including causes of failure with particular attention to loss of metal, bad contact, failure to complete travel, and freezing. Amongst other matters dealt with are means of minimising friction by the positioning of the main pivot, and the causes and control of bouncing. Sliding contacts were considered by Dr. P. F. Soper (Northampton Polytechnic) who discussed the possible properties that determine the shape of their volt-ampere characteristic. An investigation based on the assumption that field emission was the essential mechanism of current transfer has given results indicating that for sparkless transfer there is a minimum voltage of contact drop varying as the square root of the current.

Finally, in the heavy duty section, came a paper from Mr. R. F. Sims (R.A.E.) in which the nature of the carbon/copper rubbing contact and its dependence on atmospheric conditions is considered.

Light-Duty Contacts

First amongst the papers concerned specifically with the light-duty section of the convention was that read by Dr. A. Fairweather (Post Office Research Station) on the behaviour of metallic contacts at low voltages in adverse environments. This gives particular consideration to the layers that usually contaminate the surface of electrical contacts; such layers may consist of dust or grease, or of films produced by adsorption, tarnish or corrosion. The applied voltage is regarded as "low" when it is too small to initiate conduction by any process analogous to "breakdown." Mechanical methods of obtaining a metal-metal contact thus become necessary, and an attempt is made in the paper—it is believed for the first time—to describe the behaviour of a closed contact subjected to corrosion, and the closure processes for a corroded contact, both with and without "wipe." The results presented, which may provide the necessary basis for design and testing techniques, represent an interim stage in part of a wider investigation in this field which is being carried out at the Post Office Research Station.

Vibrator Contacts

Long-life contacts for unidirectional contacts of from 1 to 20 amp were discussed by Dr. A. L. Allan (Ericsson Telephones) in a paper which concerned the fundamental physical phenomena of d.c. contact operation in vibratory convertors and similar apparatus. Such convertors are used either to step up a d.c. voltage for operating radio sets, or to convert it to a.c. for driving fluorescent tubes. Power ratings run from a few watts to 500 W, with the input voltage up to 24 V. Since vibrator frequencies range from 50 to 400 c/s, a colossal number of switchings is involved, which fact coupled with the smallness of the contact gaps (about 10 mil.) means that contact wear is the major design consideration, the need for a low contact resistance taking second place.

Available literature at the time when the investigation described began suggested that mechanical wear was swamped by electrical wear. This takes place at make, bounce and break, but not while the contacts are closed. Wear at make is small compared with that at break, if each bounce is considered a separate make-break. Wear is largely a migration of metal from one contact to another, and inductance in the lead accentuates the wear at break, while capacitance (necessary for quenching arcs) accentuates the wear at and just after make. These suggestions were substantially confirmed by the work described, which fell under three headings: (1) an investigation into the phenomenon of migration, particularly in platinum; (2) some experiments in which one contact was of one metal and the other of a different metal; and (3) measurements of the effect of different gas atmospheres on the contact resistance of tungsten.

In the migration work with platinum, in which arcing was suppressed, the phenomenon when the negative contact gains material is referred to as "normal" migration. "Reverse" migration occurs if the positive contact gains material. Reverse migration is found to set in

when the voltage is low (1·5 to 2 V) or the current is high (10-20 amp).

The basis of trying different metals for a pair of contacts is that different conductivities and melting temperatures might inhibit migration if the correct polarity were chosen. When experiments were conducted, difficulties arose due to the mechanical transfer of metal from one contact to another, and due to alloying between some of the metals used. The conclusion was reached that the method is not sufficiently reliable to be worth-while developing for vibrator application.

Dr. Allen's conclusions are, that the hope of eliminating transfer by a choice of alloy is remote and will at best apply to restricted circuit conditions. However, it is felt that the best use of ordinary materials such as silver, platinum and tungsten is perhaps not being made at present as far as vibrators are concerned. A really bold policy in which contacts are made as small and light as possible, bounce is rigorously suppressed, and special attention is given to commutation, may make a greatly prolonged working life possible.

Fine Transfer

Fine transfer between contacts, and the effect of inductance on this phenomenon, was dealt with at the convention by Miss J. Warham (E.R.A.), who described the results of an investigation undertaken at the E.R.A. Previous work had suggested that fire transfer might not, as originally supposed, be arc-free, but might rather be caused by dissipation in a short arc of the inductive energy stored in the circuit at break. This suggestion was investigated by the Association, mainly with platinum contacts in a 6 V circuit, breaking currents of the order of 1 amp. The circuit inductance was controlled between 0·05 and 10 micro henrys.

Results obtained show that for platinum contacts breaking such a circuit there is a pip and crater transfer of metal from anode to cathode. Below 0·3 micro henrys inductance transfer is independent of inductance, being a true bridge transfer. Above this value, transfer is dependent on the inductance of the circuit. Measurement of the volume transferred and examination of the surface structure after operation led to the conclusion that there are two types of transfer, one being the true bridge transfer already mentioned, and the other a short arc transfer. It is not possible on the available evidence to give a complete theory of transfer. Further work at the E.R.A. should help solve some of the outstanding problems.

Fine transfer was also discussed by Mr. R. Hill Jones (University of Wales) who reviewed critically the work of earlier investigators on the properties of microscopic molten bridges as part of a general discussion on the importance of the molten metal bridge in the process of fine transfer. He related to the various theories existing the results of an experimental investigation of the properties of bridges formed in a single contact operation.

Contact Erosion

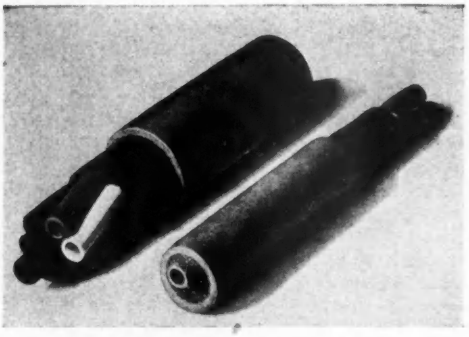
Another paper based on work at the University of Wales was presented by Professor F. Llewellyn Jones, who covered contact erosion due to electrical discharge phenomena. He discussed, in particular, metal transfer at "break" by arcs at higher voltage then the ionisation potential of the gas, low voltage arcs at break, discharge processes at make and electrode evaporation. The paper emphasises in particular the importance of discharge phenomena in contacts just about to meet; it is suggested that this has been unsuspected. The physical processes of avalanche initiation and growth under these conditions are treated in detail, and recent experiments designed to elucidate the mechanism are described and discussed.

In a paper read by Dr. J. C. Chaston (Johnson Matthey) a review is given of the character of films formed on the common contact metals in industrial atmospheres. The effect of such films on contact properties is discussed, and the effect of heating by the arc at break considered. Sulphide films on silver contacts receive special attention, with a consideration of factors influencing their rate of growth in sulphur contaminated atmospheres and their dissociation by arcs and heating generally.

Something of the gap that exists between theoretical work on contact phenomena and practical considerations was revealed by Mr. D. O. Walter (Johnson Matthey) in a paper on light duty sliding contacts. Problems that he specially discussed covered slip rings employed in various items of signal and test equipment and the use of precious metal contacts in certain applications of telephone selector switching. A more general review of contacts in telephone exchange systems was given by Messrs. C. W. A. Mitchell and T. F. A. Urben (P.O. Engineering Dept.). They discussed from a practical viewpoint various contact materials, with special reference to the components on which they were mounted. High-speed films of contacts in action were used to illustrate the lecture.

P.V.C. Pressure Tubing

MULTI-WAY ASSEMBLIES NOW AVAILABLE



A MULTI-WAY form of polyvinylchloride tubing has been developed by Pirelli-General under the trade name of Pigemultiflo. The tubes are laid up in the form of a cable with the interstices filled with jute wormings. A standard size of tube with ¼-in. bore and a wall thickness of 0·06 in. is generally used, but ⅛-in. bore tubes with the same wall thickness are also obtainable. At present, assemblies can be obtained with seven ¼-in. tubes or fourteen ⅛-in. tubes, and the maximum length available in a continuous run is 500 yards. Full colour coding can be given, the tubes themselves being red, white or black with the addition of a second colour in the form of a longitudinal line.

Normally a p.v.c. sheath is applied, but where the possibility of damage is present, single galvanised wire armouring is added, and where corrosion might present difficulties, an external compounded jute serving or hessian tape is applied overall.

Installation

The tubes were originally developed for instrumentation purposes, using dry air at pressures up to 35 lb/sq in. gauge, and they are accordingly tested individually at 50 lb/sq in. Developments now in progress to reinforce the single tubes will make them suitable for pressures up to 200 lb/sq in. Joint boxes and terminations are similar to those used for electric cables, and cone type connectors are used for connecting the tubes together or for connecting to equipment.

LUMINESCENCE and Lighting

THE general subject of Luminescence as applied to Lighting was considered by Messrs. H. G. Jenkins and A. H. McKeag in a Paper presented to the Illuminating Engineering Society on Tuesday. In the low-pressure mercury vapour lamp, most of the radiation lay in the short wave ultra-violet spectrum, making the use of fluorescent powders a practical and economic proposition. In the h.p. mercury vapour discharge most of the energy was in the visible spectrum, and no worthwhile gain in luminous efficiency was possible, although the colour rendering could be greatly improved.

Phosphors

Phosphors were prepared from extremely pure starting materials to which were added small amounts of the necessary activator compound which was incorporated into the crystalline lattice by heat treatment. Manganese was frequently used as an activator. The available phosphors provided a wide range of spectral energy distributions covering the whole visible spectrum and extending well into the ultra-violet section.

In the fluorescent lamp the problem of lumen maintenance had been studied extensively and much was now known about the effect of phosphor composition lamp processing, and the cathode emissive coating products on light depreciation. The more usual cause of poor lumen maintenance was interaction between excited mercury atoms in the discharge and phosphor crystals which resulted in a tenacious film of mercury or mercury compounds on the coating.

Luminescence in glass was even less understood than that in the crystalline materials. Glasses activated by molecular groups as well as by neutral metallic atoms were known, but the latter type were not satisfactory unless the iron content was very low. Efficiencies were about half those obtained with normal phosphors and apart from a limited use with neon signs fluorescent glasses had not come into widespread use.

The paper concluded by giving some brief details of electroluminescence, or, "luminous capacitors" and stated that much progress would have to be made before this could be regarded as a serious lighting agent.

Keeping the Plant Running

Importance of Efficient Maintenance stressed at I.Mech.E.

MAINTENANCE of plant buildings and equipment is a subject which in the past has to a large extent been regarded as a necessary evil, and in consequence has not received the attention due to it. The old idea, of letting machinery run on until it breaks down, must go because it tends towards inefficiency, particularly so today when the availability of new plant is bad and the prices high. The only solution is therefore an organised maintenance system, comprising not only major overhaul and repair when trouble has occurred but also preventative maintenance. Some idea of the requirements of a factory maintenance engineering department was given to the Institution of Mechanical Engineers last Friday by Max Bentham. He pointed out that many production manufacturers had hoped to replace old machinery when the "sellers' market" passed in 1949 and machinery manufacturers could be expected to release more plant for the home market. The turn of events in 1950 had however, caused these hopes to diminish, and the need for planned maintenance was more than ever important to keep the production line running.

Preventative Maintenance

Equipment failed from three main causes. These were: normal wear and tear, accident, and unsuitable design. With regard to wear and tear, proper inspection and recording could minimise stoppages. Where accidents occurred, high-speed maintenance was essential and the cause of the accident analysed to preclude further trouble. Unsuitable design, however, implied temporary repair followed by discussion with the original manufacturers to amend or modify the design.

The essential feature of preventative maintenance was the carrying out of necessary repairs and component replacements at such times as to cause the minimum of interference with production. In large factories a proportion of spare units could usually be afforded where there were many similar machines. In smaller factories, the machine should be inspected at a fixed interval before the overhaul and all the necessary equipment itemised and the job time estimated.

It was essential that each machine should possess a record card giving all the essential data such as date of manufacture, maker, drive, any modifications and a record of all maintenance carried out.

In the small factory, there is often little choice as to where the engineer's or millwright's shop should be placed; the problem of accessibility should not, however, be overlooked, and the shop must not be tucked away in any odd corner where supervision was impossible.

The location of the maintenance department in a large undertaking is often a difficult problem. The main criteria are: a central position relative to those production units liable to give the most trouble, easy access by road and possibly rail, and the department should be self contained as far as possible. The size of building would naturally depend on the amount of work to be done and the size of the plant to be handled.

Equipment should be of a general purpose nature in most cases, although in certain cases special tools may be introduced due to difficulties of transporting equipment. In the smaller plants the medium sized faceplate and gap bed centre lathes are to be recommended. Milling machines would have a good application in the larger plants but for smaller concerns the single point tool machines, slotters and shapers, would have a more universal application. Plenty of fitting shop room should be available for machine erection and the necessity for a good surface table for checking assembly should not be overlooked. Where machinery is used in dirty conditions a degreasing plant is essential.

Stores would be required on a dual basis; consumable stores such as lubricants, cleaning materials, brushes, machine felts in paper mills and so on, and replacement stores and plant spares. Accurate records should be kept of stores outgoings and stocks so that estimates for replacement ordering could be put on a rational basis. Tools could either be drawn from the main stores or kept in the maintenance department as the main production tools often passed through maintenance for reconditioning.

Personnel

In a large or medium organisation, it was common for a chief engineer to be in charge of the maintenance department, with a millwright

and an electrical engineer taking responsibility for their own sections. Where maintenance was on a large scale, the employees could be divided into "out-working" gangs, on regular check-up and oiling; those on special repair work, and those on regular repair within the maintenance shops. Interchange of "out-working" employees and shop employees was desirable, but not always possible due to differing rates and the necessity for holiday working.

Control of "out-working" gangs was difficult, telephonic communication was sometimes used and in America two-way radio had been found most useful. This could enable gangs to be directed to breakdowns rapidly.

The detailed costing of maintenance was a problem which was often ignored or only partially appreciated. Cost recording could be done on lines similar to that of an organised production shop. The necessity for proper overhead allocation to all jobs should be remembered, and administrative costs should be included in these. "Out-working" gang costing was particularly difficult as the gangs may have to leave their planned jobs to cope with emergency breakdown. However, by the issue of daily work cards a fair check of the work done could be recorded. Slack and rush periods would inevitably occur, and it was worth while spending time and money on spreading the load as smoother working of the plant reduced both production costs and maintenance time.

The paper concluded by giving details of typical maintenance shops both good and bad.

Answer to Critics of B.E.A.

SHIPS, supply and history were the themes of the principal speakers at this year's annual dinner and reunion of the Association of Supervising Electrical Engineers, which was held last Friday. Chairman for the evening was MR. A. G. RAMSEY, C.B.E., immediate past-president of the Association, who deputised for Mr. T. G. N. Haldane, absent on a visit to Australia and New Zealand.

The toast of the Electrical Industry was proposed by DR. S. F. DOREY, C.B.E., F.R.S. (Chief Engineer, Lloyd's Register), who dwelt at some length on the way applications of electricity afloat had grown since in 1879 Graeme dynamos had supplied current for saloon lights in S.S. "Mendoza." The advent of the tanker, with its special safety requirements gave a great impetus to ship electrification. Turning to the application of electricity in shipbuilding, the speaker had a good word for electric welding: ships that had broken up were all built before 1945, and had been victims of welding with too heavy currents.

Sir John Hacking (President, I.E.E.) replied to the toast, and took the opportunity of replying in a characteristically outspoken way to critics of the supply industry. He began by saying that there was no prospect of a serious curtailment in the rate of growth of demand: the demand for greater production and productivity would avoid that. Essentially, the supply industry worked on a basis of co-operation, especially with the plant manufacturers and—though here it might be closer—with contractors. Such co-operation showed what could be achieved as between public and private industry.

Coal Problems

At present planned sets were limited in size to 120 MW, because if the unit principle, with all its economics, were to be applied, then larger boilers were difficult to build to burn the coal which in this country was made available for generation. In regard to load shedding, he thought that we were not yet out of the wood. He rejected criticisms of B.E.A. expansion which were based on the query "Where is the coal to come from?" There was plenty of coal available: it was the job of the N.C.B. to get it out of the ground, not the B.E.A.'s. Unfortunately, the public seemed to readily accept that the coal could not be obtained.

The supply industry, suggested Sir John, was "over administered." He emphasised that this was not a reflection on his colleagues: he was referring to the fact that everyone seemed to think that they were much more capable of administering the industry than were those who had the job. Consequent criticism worked to reduce efficiency, for those in control automatically took steps to meet the adverse comment and thus departed from what they felt to be the best course. The public were the "equity shareholders" of the supply industry, and they had the right to criticise: but they also had a duty of trusting.

Dealing with recent attacks on the use of electricity for space heating—he preferred to call it comfort heating—Sir John thought that if people liked to burn coal, good luck to them: if they could get it. Bituminous coal burnt in appliances designed for smokeless fuel was little more efficient than when used in an open fire. He called for freedom of choice, providing that those supplying the fuel ensured that the price of it was reasonably related to the cost. This was done in the case of electricity.

A lighter touch was adopted by Sir Arthur Fleming, C.B.E. (A.E.I.), in his response to the Chairman's toast of the guests. He kept his audience interested and amused by stories of the early days of the Ferranti station at Deptford. He did hark back, however, to what Sir John Hacking had said about co-operation in the industry. He thought the industry had three important bastions—the training of new entrants to help them profit by the experience of their forerunners; co-operation between its various sections; and high ethical standards.

Lighting on a Concrete Bridge

Method of Column Erection in Restricted Space

AN unusual street lighting problem arose when G.E.C. sodium lighting was installed on a section of the A.9 road in Dunblane, Scotland. Where the road crosses the Allan Water over a bridge of reinforced concrete, one of the columns had to be sited where the surface of the central grass reservation was only 12 in above the decking of the bridge. Instructions had been given by the Ministry of Transport that no columns were to be attached to the framework of the bridge for fear that it should be twisted in the event of a collision.

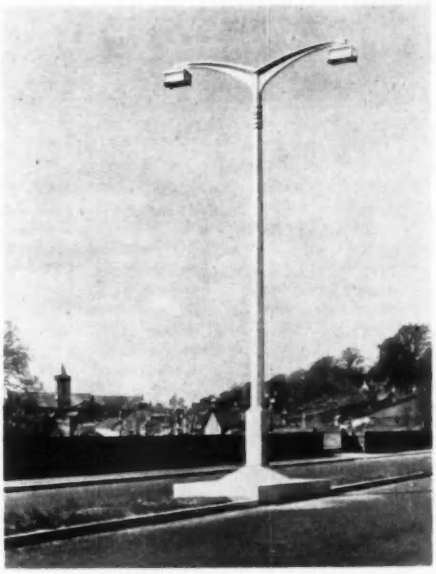
A Special Column

The pole manufacturers, the Springbank Quarry Co. Ltd., therefore arranged with their consulting engineers for a column to be designed with special reinforcing. This column had to be set in a concrete base measuring 12 ft long by 6 ft wide by 2 ft deep. Since the depth available on the site was only 1 ft, the base would project 1 ft above the surface of the grass, as it was impracticable to reduce the size of the base reinforcing.

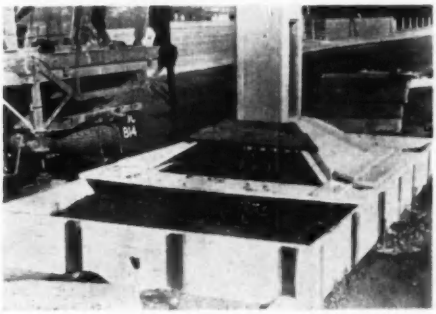
On excavating the foundation for the column, three G.P.O. ducts and an underground cable were revealed. When the G.P.O. was consulted its engineer saw no objection to the proposed mass of concrete being laid on the ducts, which were constructed of a pressed fibre material, as long as additional reinforcement was provided as an extra protection.

The protective reinforcing for the ducts consisted of a 12-ft by 2-ft mat of $\frac{5}{8}$ in and $\frac{1}{2}$ in dia. interlaced reinforcing rods. This was placed in position over the ducts and concrete poured in to a level of approximately 2 in. above the protective reinforcing mat. Next, the main reinforcing mat was laid in position, and the column, with its complicated extended reinforcing, was made ready.

Wooden shuttering which had been prepared, in the meantime, was installed after the column had been set in a vertical position, and the concrete was poured in. Although the concrete used was quick-hardening the additional precaution was taken of carrying out the work early on a Sunday morning when traffic, which is normally very heavy, was at its lightest. Look-outs were stationed at each end of the bridge to ensure that any traffic crossing, while the concrete was hardening, did not exceed 5 m.p.h. Finally, a concrete wash was applied to the base, which had been chiselled all over for this purpose, so that in the finished job the base is of the same colour as the column itself.



This view shows the completed lamp column and foundation block in the grass centre strip dividing the carriageways on the bridge



The foundation area shuttered preparatory to pouring in the concrete. Note the reinforcing bars emerging from the column

overseas news

Siting Stations

The suggestion that Australia should generate power at its coalfields and transmit it to the main centres of population was made last month by Professor M. L. Oliphant, director of the School of Research and Physical Sciences at the Australian National University. He considered that the result would be a greater output of more economical power. The messy business of carting coal about the country should stop, he said. Accountants maintained it was cheaper to cart the coal and burn it in the cities, but if the problem was looked at broadly the case for generating power at the coalfields was overwhelming. The over-all economy of a country—which includes the dirtying of collars and buildings—suggests that it be done outside the cities, he added. He also advocated that Australia should build its first experimental atomic power station near Port Augusta, to operate on South Australian uranium.

Newfoundland Plan

Two rivers in South Newfoundland, the Grey and Bay d'Est, are capable of producing 280,000 h.p. capacity, with an energy output of one billion kW/hr, according to the Power Corporation of Canada in a report to the Newfoundland Provincial Government. Cost of the development would be $51 millions. Cost per kW/hr would be 0·43 cents it is estimated. An alternative partial development would provide 70,000 h.p. it is stated. According to the first report of the survey, the harnessing of the Grey and Bay d'Est Rivers would take three years to complete. It would be a hydro project which would combine the flow of the two rivers, as there is no available power site on the Grey. The site is within 100 miles of Arnold's Cove and 200 miles of St. John's.

Manitoba's Next Scheme?

If Winnipeg electors on April 16 endorse the plan for provincial ownership of all Manitoba power resources, the Government will ask for the green light on development of McArthur Falls, it is reported. This is the last undeveloped site in the Manitoba watershed of the Winnipeg River. Estimated cost of the development is between $20 millions and $22 millions. Much preliminary investigation has already been completed but even if development is authorised it will take at least four years to complete. The potential capacity of McArthur Falls is put at between 60,000 and 70,000 h.p., which is less than two years' load growth at present rate of increase. But local consumers have been given plenty of warning that when the Arthur Falls is developed it will mark the end of low cost power development on the Winnipeg River. From then on, if Manitoba requires reasonably priced power in any substantial quantities, it must go to the Nelson or Dauphin Rivers.

Shawinigan Results

Canada's largest privately owned electric supply undertaking, the Shawinigan Water and Power Co., in its report for 1951 shows that the total generating capacity of its system, peak load and consumption by residential consumers all reached new high levels. Units sold were 14·8% higher at 7,538·4 million, but sales to industrial users were 23·2% higher than in 1950, and residential, farm, commercial and municipal sales were 12·5% up. Completion during 1951 of five power units at Trenche to produce 325,000 h.p. raised generating capacity to 1,562,700 h.p.—almost double the 1939 capacity—and, with purchased power, made possible a new record peak load of 1,680,563 h.p. There were 53 new industrial plants and 10,193 other new customers connected in the year.

Heating Load

In Vancouver, the number of homes heated entirely by electricity has doubled in the past six months, members of the Electric Heating Association forum were told last month by Mr. C. McAdam, of the British Columbia Electric Co. A quarter of a million dollars of electric heating went on his company's power lines last year, he added. While the great majority of such installations had been most satisfactory, he warned that the system could be expensive if not properly installed.

Electrification Work

The electrified railway line, some 40¼ miles in length, which connects Blonie, Wolomin, Tluszcz and Ozarow with the centre of Warsaw was put into operation a few days ago. Cost of the scheme is stated to be 114 million zlotys. Much of the equipment has been supplied by ASEA, of Sweden, we gather. At the opening ceremony, Deputy Prime Minister Stefan Jedrychowski explained that under the Six-Year Plan, the electrification of the Warsaw and Gdansk junctions will be expanded, the electrification of the Katowice junction will be started and the Warsaw-Katowice railway line will be fully electrified. In Warsaw too an underground electric railway is under construction.

Protective Duty

A Bill to provide for the extension of existing tariffs on several types of goods imported into Pakistan, has just been published in Karachi. Among the items covered are electric fans on which the protective 45% *ad valorem* duty is to be extended by a further year to March 31, 1953.

State Date Extended

The time limit within which State Governments are to constitute Electricity Boards has been extended for a further year to March 31, 1953, under an Order recently made by the Government of India. So far only two States—Delhi and Madhya Pradesh—have formed the State Electricity Boards in compliance with the Electricity (Supply) Act, 1948. Originally it was intended that these boards should have been constituted by 1950, but that date was altered to 1952 and is now extended to 1953.

New Site for Station

Cape Town city council has now recommended that the proposed new £8 million power station on the Cape Flats should be erected near Epping Industrial Township instead of at Duinefontein as originally suggested. One reason for the change is the need for good railway facilities for handling coal—about 4,000 tons a day will be required. And the Railways Administration is proposing to establish a new marshalling yard at Woltemade No. 1, which will connect with the new yard at Langa and areas on the south of Epping industrial township. Another important reason is that the Epping site is nearer to the Athlone sewage disposal works, since it is the use of sewage effluent for condenser cooling water purposes which makes the establishment of a power-station on the Cape Flats possible. A further factor in favour of the Epping site is that the cooling towers necessary to use the sewage effluent would, if erected at Duinefontein, conflict with the height building restrictions in the vicinity of Cape Town's new airport. The question of using the new site has been referred to the Native Affairs Committee, under whose control the land at present falls.

Johannesburg Tariff Changes

In Johannesburg, consumers are to pay an additional 10% for electricity from the July meter readings, to provide the City Council with an additional revenue of £262,000 in a full year. Under the present domestic tariff six units per living room are charged at 4d., and the balance at ½d. The new rate will raise the primary units to eight per room. Another change will be that for the first time in Johannesburg, industries and business premises will be asked to pay a fixed charge of £20 a month as a minimum. Johannesburg has always had a two-rates tariff for businesses—for valley and peak periods, in an effort to persuade consumers not to overload the peak period, but this is regarded as "a relic of the dim and dusty past" and is to be abolished. It should be added that in 1950 the city council decided that the Electricity Department should pay a fixed sum of £250,000 annually to the relief of rates, and that any surplus should be transferred to a reserve fund. Mr. G. B. Gordon, chairman of the Finance Committee, has said that they expected by 1954 to take £132,000 out of that fund.

Power Scheme

In Madagascar a new public utility company, with the title of Societe D'Energie De Madagascar, has been formed with backing from the Administration. This concern is intended to study and carry out hydro-electric schemes in the island. Its capital will be raised entirely locally.

Small Scheme

The Taupo Town Board, North Island, New Zealand, has now been officially authorised to operate a hydro-electric plant on the Hinemaiai (or Hatepe) stream flowing into Lake Taupo. The Board is also empowered to erect power lines. Contractors started work last November to dam the stream to form a lake above the power house. When the station is completed the turbines will operate on a head of 105 ft. Output of the station is put at 1,000 kW, while the transmission system will operate at 11 kV. Consulting engineer to the Board, Mr. L. Mandeno, has said that the civil engineering work should be completed in June. Until the 1,000-kW turbine is received from England a smaller machine with an output of 150 kW is to be used. The scheme has been financed by a loan of £115,000.

Fireguards

Following the move in Britain, the New Zealand Institute of Electricians, at the annual conference, recently, adopted a recommendation proposing the fitting of an effective guard or screen mesh should be made compulsory on all open type radiators.

Loan for Development

The United States Export-Import Bank has announced four credits to the Indonesian Government totalling $22,770,000. The credits would be used, the Bank said, to finance the import from the U.S. of equipment and materials required for the reconstruction and development of the Indonesian economy. The new credits include one amounting to $8,300,000 for the purchase of diesel and hydro-electric generating equipment, transmission line materials, and accessory control and protective equipment to assist the Indonesian Government and private utilities to restore damaged generating plants and to permit increased production of electric energy in certain critically short areas.

PERSONALITIES

IN THE INDUSTRY

Deputy chairman of the new Royal Ordnance Factories Board, the formation of which was announced by the Minister of Supply last week, is **Mr. C. K. F. Hague,** M.I.Mech.E., A.M.I.E.E., deputy chairman and managing director of Babcock and Wilcox Ltd.

The Council of the Institute of Fuel has awarded the Melchett Medal for 1952 to **Professor D. T. A. Townend,** D.Sc., Ph.D., D.I.C., Hon.M.Inst.Gas E., F.Inst.F., in recognition of his outstanding contributions to the science of combustion, particularly in the field of higher hydrocarbons. Dr. Townend is director-general of the British Coal Utilisation Research Association.

In Canada, Mr. Claxton, the Defence Minister, has announced the appointment of **Sir Robert Watson-Watt** as adviser in radar and electronics to the Canadian Defence Research Board.

To mark the completion of 40 years service at the Sheffield district office of the British Thomson-Houston Co., the manager, **Mr. C. A. Russell,** has been presented with a portable typewriter and a scroll bearing the signatures of the subscribers. The presentation was made at the staff dinner-dance by **Miss E. Hensman,** chief clerk, who has herself been with B.T.H. for 32 years.

After serving for many years on the London office staff of the Metropolitan-Vickers Electrical Co., **Mr. B. Leigh** and **Mr. W. A. Anderson** have retired. Mr. Leigh joined the Manchester Office of the British Westinghouse Co. in March 1902, and later transferred to the export side of the organisation. After a period as representative in Italy, he took part in setting up a London "Traction Bureau" to co-ordinate the various Westinghouse activities in Europe, and has been with the Traction Department ever since. Mr. Anderson started in the British Westinghouse Meter Department in 1909 and in the following year was appointed meter sales engineer for the south of England.

Mr. W. A. Anderson

Eight prominent members of the staff of Falk, Stadelmann and Co., who retired from the company's service at the end of March, were recently entertained at dinner by the directors. Between them, the eight boasted a total of 341 years service, apart from another member of the staff also at the function to celebrate the completion of fifty years' service with the company. Among those entertained were: **Mr. H. Perkins,** a senior representative, who is well known in the many areas he has represented the company, especially in the Eastern counties; **Mr. A. O. Wing,** who has served for 48 years in the Electric Light Fittings Department (he received his initial training under Mr. E. Barnard who retired two years ago, and has materially assisted in the development of that section of the business); and **Mr. A. Standing,** office manager of the Manchester branch, who has been with the firm for 45 years. The "baby" of the party was **Mr. W. C. Jeary,** aged 76, who has spent 23 years with Falks. Until the end of the war he was manager at the Farringdon Road Showroom, and has been manager of the West End branch in Mount Street since its inception. He is succeeded in the latter post by **Mr. A. Craven** who has been transferred from the company's Leeds branch.

Mr. H. Perkins

Mr. W. C. Jeary

At a recent meeting of the board of the Pressed Steel Co., **Mr. M. A. H. Bellhouse** was appointed deputy managing director and **Mr. F. E. Cairns** and **Mr. W. E. Lambourn** directors of the company. The following senior executives have been made local directors: **Messrs. R. Craig, D. D. Hobday, J. A. Keyden, R. Robertson,** and **E. G. Rowledge.**

Mr. H. F. Reeman, who recently retired from the position of district manager in South Wales and South West England for Babcock and Wilcox Ltd., which he held for 21 years, has, with the approval of that firm, been appointed to the board of the Rhymney Engineering Co., Ltd.

At the annual general meeting of the Batti-Wallahs' Society, **Mr. J. W. Perkins,** A.M.I.E.E., of Gresham Transformers, was elected President for the ensuing year, in succession to Sir John Hacking. **Mr. T. C. F. Bigland** was re-elected honorary secretary and treasurer, and **Mr. J. Temple Hazell** is again to fill the office of assistant honorary secretary. The following members were elected to the Committee: **Dr. L. G. Brazier, Messrs. M. D. Cloran,** M.C., **A. G. Freeborn, A. N. East,** C.B.E., **J. Nelson** and **J. W. Woolley**

Mr. W. W. Syrett, F.I.B., F.R.ECON.S., export sales manager of E. K. Cole, Ltd., has been elected chairman of the B.R.E.M.A. Export Policy Committee. Mr. Syrett, who joined Ekco in March 1945, was formerly foreign manager of a clearing bank, and his book *Finance of Overseas Trade* has become a standard work on the subject.

Mr. W. W. Syrett

Mr. F. R. Fitzpatrick has resigned from the board of the Superheater Co. and **Mr. J. V. Santry** has been appointed in his stead.

There are many in the Electrical Industry who remember **Mr. O. H. Sherrard,** who was secretary of the former Central Electricity Board for a number of years. They will be interested to hear that of recent years he has devoted much of his time to reviewing the lives of important personalities of the past. He has already had published books on the lives of John Wilkes and of Lord St. Vincent. His latest volume, entitled *Lord Chatham,* which is shortly to be published by John Lane the Bodley Head, Ltd., price 25s., reviews that part of the life of the elder William Pitt from his birth up to the time of his dismissal from office in 1755 —an interesting period of continuous struggle. In preparing the work, Mr. Sherrard has studied many of the original documents, enabling him to throw new light on some of the more obscure passages of Pitt's early career, so the book should provide very interesting reading.

E.M.I. Sales and Service, Ltd., announce the appointment of **Mr. W. H. Perkins,** O.B.E., M.SC., as their educational adviser. Lately director of education for Warwickshire, Mr. Perkins succeeds **Mr. A. C. Cameron,** M.C., M.A., whose resignation on medical advice the company have reluctantly accepted.

Mr. R. J. Lewis has succeeded **Mr. A. Wells** as Controller, Post Office Supplies Department. Mr. Lewis entered the service of the G.P.O. in 1914.

Mr. F. J. Erroll, M.A., A.M.I.E.E., A.M.I.Mech.E., has joined the board of Taylor Woodrow Ltd.

Major-General L. B. Nicholls, chairman of Cable and Wireless, Ltd., left London by air last Tuesday to visit Cyprus, where he will discuss the future of the island's telephone system with the Governor, Sir Andrew Wright. The company operates the internal telephone system as well as the external telecommunications of Cyprus. General Nicholls will arrive in Cyprus on April 18. He will break his journey to visit the company's stations at Tripoli, Benghazi and Malta, Cable and Wireless Limited's Mediterranean control station, to inspect the working of the Tripoli-Malta-Benghazi radio-telephone service which links Tripoli and Benghazi with each other.

OBITUARY

Mr. W. R. Steele, M.I.Mech.E., M.I.E.S., A.M.I.E.E., M.I.P.I., died on April 1, aged 67. He had for many years been a principal technical officer in the Mining Section at H.M.S. *Vernon,* Portsmouth, from which position he retired in February 1945. He went there as an Admiralty engineer in 1917, after gaining industrial experience with Armstrong and Main, Ltd., Sir Wm. Arrol and Co. and Geo. Russell and Co. Ltd.

Mr. Harold Morehouse, Manchester regional manager of Philips Electrical, Ltd., died on April 2, aged 53. He joined the company, at Liverpool, in 1925, and after a period as a lamp representative became branch manager at Liverpool. In July 1950 he was appointed branch manager at Leeds, and transferred from there to Manchester as regional manager in May, 1951.

Mr. J. H. Dunbar, formerly chief electrical engineer, London, to the old Eastern Telegraph Co., died at West Kilbride on April 3, aged 86.

British Capacitors in Canada

LAST September the first large capacitor bank ever to be supplied to Canada by a British manufacturer completed its first twelve months in service.

This 15,000 kVAr, 11 kV bank, manufactured by British Insulated Callender's Cables, Ltd., is connected to the system of the Shawinigan Water and Power Company. The arrangement was something of an innovation in Canada in that it is built up from large internally fused tank-type units, each of which has an output of 250 kVAr. The units are installed outside without weather protection, and are therefore subjected to the large seasonal variation in temperature which is normal in Canada, and which may range from —40° F to 100° F. In order to check the performance of the bank, the capacitance of each unit was recently measured at site by means of a capacitance bridge, and results obtained were compared with results of tests made in the factory immediately after manufacture. It was found that no observable loss of capacitance had occurred during the first twelve months of service in any of the 60-250 kVAr units which make up the bank.

A later installation involving a 20,250 kVAr 10 kV bank supplied by British Insulated Callender's Cables, Ltd., to the Aluminum Company of Canada, Ltd., was also tested about the same time, and equally satisfactory results were obtained. Such results, while they cannot of course be used to predict the ultimate life of the capacitors, do give promise of continuing reliability.

Servo Systems

Their Specifications and Details Discussed at the I.E.E.

SUBJECTS of increasing importance today are the servo mechanism and the process controller. With the growing application of these allied systems to production lines, the desirability of having a specification acceptable both for user and manufacturer is unquestioned. The form this should take was discussed by the I.E.E. Measurements Section on April 1. Professor A. Tustin, who opened the discussion, dealt with positional control systems.

He quoted the following as the users' requirements which needed to be defined in the specification for a position control system: accuracy on specified duties; behaviour when coming into alignment after a large initial misalignment; speed and torque limitations at the load; life and reliability of machines and elements; behaviour under special operating conditions; life and reliability of the mechanical parts of the load, such as elimination of "jitter"; and avoidance of possible false alignments. He stressed the need for supplying data on the most onerous duty which the system had to fulfil and pointed out that accuracy for a servo-mechanism had meaning only when related to a specific duty. The second speaker, Mr. J. F. Coales, showed that the criteria chosen for specifying position control systems were, with little modification, equally applicable to process control systems. He underlined the need for avoiding redundancy in the selection of the criteria.

He contrasted the respective performance requirements of position and process control systems by means of slides which illustrated the examples of the training on to a target of a searchlight on the deck of a rocking ship and control of flow of two gases so mixed that the calorific value of the mixture remained constant.

The first speaker in the ensuing general discussion pointed out that the motor size was frequently determined by r.m.s. torque, peak torque being difficult to achieve, especially for tracking servos, and for such systems he recommended the tightening-up of specifications with regard to slow performance. Where r.m.s torque was a deciding factor its inter-relation with gear ratio, he maintained, should not be lost sight of.

Another speaker drew attention to the rather different conditions applying in specifying control systems for experimental plants. He thought that the seven criteria laid down by the first opening speaker were comprehensive, but that they might have been amplified to cover the reliability requirements under fault conditions. He advocated the preparation of a provisional specification to be discussed by the manufacturer and user before a contractual specification was drawn up. This proposal received favourable comment from later speakers. One speaker criticized the proposed criteria on the grounds of the meagreness of the data they required on dynamic characteristics, while several later speakers held opposing views on the relative merits of tests of control systems by means of sinusoidal and transient test inputs.

A further speaker demonstrated mathematically the significance of error criteria, maintaining that the user of control systems was really interested in their instantaneous error response. A speaker engaged in the design of process control systems in the chemical industry for which data on the plant as a whole were difficult to obtain, pleaded for the provision of criteria for specification of a single part of a system, e.g., the controller itself, defining in addition its limits of adjustment, since chemical engineering plants, as opposed to mechanical systems, were continually changing their characteristics.

SERVICING DOMESTIC REFRIGERATORS

AN analysis of defective sealed system type domestic refrigerators which had been returned to the makers for repair has shown that an unnecessarily large number were only suffering from minor faults which could have been dealt with on site. In order to help the maintenance electrician, an instruction manual has been produced by the Electrical Development Association in collaboration with the British Refrigeration Association. The first point covered is the basic wiring diagram of the sealed unit refrigerator. This is followed by a description of the operation of the starting and overload relays, details of general service procedure, and notes on the diagnosing of faults and remedies to be applied. A separate section is devoted to similar information on the English Electric refrigerator which is quite different from the majority of other makes.

The booklet is in a convenient form for carriage in the mechanic's tool kit or pocket, and will cover practically all post-war refrigerators.

Copies of this new E.D.A. publication are obtainable from the Association at 2 Savoy Hill, London W.C.2, price 1s. 6d. each.

The BUYER'S *Column*

The "Economist" Fire

BECAUSE there is an extremely heavy purchase tax on electric fires, it is obvious that they must sell at the lowest prices consistent with safety and good design.

FALK STADELMANN AND CO. LTD., 91 Farringdon Road, London E.C.1, claim that their new "Economist" electric fire has been designed from

This fire is an "Economist"

the outset to produce a fire which has a pleasant appearance, is robustly built, and has a high efficiency, yet sells at a reasonable price.

It is a dual purpose fire for use as a standing portable or for wall mounting. The highly polished reflector is of true parabolic shape for maximum efficiency, and is adjustable to radiate heat in any direction. The elements of the rod type are protected by a well-designed safeguard.

We have illustrated the 1 kW model, which costs £2 17s. 6d. plus £2 2s. 3d. purchase tax, whilst the 2 kW model, which is identical except that two parallel elements are fitted, one controlled independently, costs £3 15s. plus £2 15s. 2d. p. tax. Dimensions are 11½ in. high, 16 in. wide, 10 in. deep. Finish is black-and-cream enamel.

Price Increases

NOTICE of further price increases has reached us from NEWTON AND CO., LTD., 72 Wigmore St., London W.1.

Their revised price list of visual-aid equipment took effect from March 1 and is set out as under:—

	£	s.	d.
Hand Episcope (includes lamp) ...	51	15	0
Adaptable Diascope (includes lamp)	28	15	0
F.S.2/1,000 M/E Filmstrip Diascope (includes lamp)	74	15	0
Lightmaster Filmstrip Diascope ...	18	18	0
250 W lamp	1	1	0
300 W lamp	1	6	0
Metal carrying case	2	5	0
Wigmore Epidiascope Model WG. 50 (includes lamp)	75	0	0
Newton Epidiascope Model N.A. ...	95	0	0
Lamp	1	18	9
Micro-projector—Series I (includes lamp)	43	10	0
Microscope attachment	22	0	0
Rotavisor			
Table model, mercury lighting ...	110	10	0
Table model, filament lighting ...	86	10	0
Extra for Console model, in each case	4	10	0

THE TELEGRAPH CONDENSER CO. LTD., Wales Farm Road, North Acton, W.3, also announced changes with effect from April 1, 1952.

These are set out below:

Hikonol Energy Storage Condensers:

H.K. 15, £5 H.K. 33, £10
H.K. 28, £8 15s. H.K. 34, £22
H.K. 50, £15 10s.

Ignition Condensers:

All types listed 4s. now priced 5s.
„ „ 5s. „ „ 6s. 6d.

"Caradio" Interference Suppressors:

S. 6485, 7s. S. 6585, 7s.
S. 6536, 8s. S. 6586, 7s.
S. 4481, 6s. S. 6775, 6s.
S. 4494, 6s. S. 6537, 6s.

"Regulite" for Comfort

ILLUSTRATED below is a new table lamp recently marketed by P. W. BAKER AND SONS LTD., 5-15 Ten Bell Lane, Norwich, which incorporates a five-position dimming switch in the base.

The Regulite lamp permits four levels of lighting

Suitable for use with normal 40 and 60 W lamps on a.c. supplies 200-250 V, the dimmer permits four degrees of illumination. The makers say that bright light for reading, a diffused medium light for social activities, and levels of illumination for T.V. viewing, the nursery and sick room are easily obtained by turning the dimmer control. The lamp itself is in onyx finish plastic material in four shades (cream, pastel green, shell pink and pastel blue), with the shade tinted to match.

Price to retailers is £3 9s. 4d. less 33⅓% plus 15s. 5d. p.tax; without the shade, the lamp costs £2 5s. less 33⅓% plus 10s. tax. The firm also supply a separate dimmer control switch in a neat mottled-cream finish case at £1 8s., no tax.

Anti-static Boots by Dunlop

WAR-TIME research in their laboratories enabled THE DUNLOP RUBBER CO. LTD., Clerkenwell Hse., Clerkenwell Green, E.C.1, to produce their special anti-static footwear, now available for use in a wide range of industries. Most vital feature of this invention is its use as a safeguard by workers handling high explosives, and by doctors and nurses during operations where anaesthetic gas is used. Under these conditions, a spark caused by static electricity could be dangerous, but the special rubber of which the footwear is made allows static electricity to pass harmlessly through.

Shaking the Dirt Out

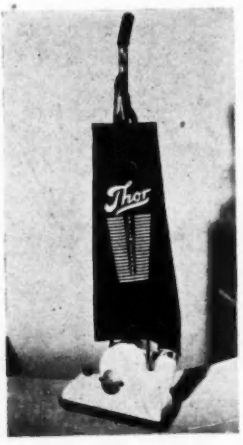
RECENTLY marketed by the SONIC WASHING AID COMPANY LTD., 31 King's Road, London S.W.3, is a device which when suspended in the vessel containing the washing and soapy water emits a series of pulsations which it is claimed causes the dirt to be loosened from the fabric.

This new machine, known as the "Pulsette," is powered by an electric vibrator. The pulsations are multi-directional, obviating the need for any movement of the clothing, etc., in the washtub.

The unit may be suspended by some form of bridge in a wash boiler, stood on its base end in pail, sink, or washtub, or clamped to the side of the pan. Weighing 8¼ lb., 15 in. long x an overall diameter of 7½ in., the unit is for a.c. supplies and costs £16 8s., purchase tax extra.

Thor's "46" Cleaner

NEW Model 46 vacuum cleaner introduced recently by THOR APPLIANCES LTD., 64-66 Oxford St., London W.1, has as its principal virtue its special lightweight construction permitting easy manoeuvring and easier housework.



Entirely British made, the "46" has a revolving brush which sweeps without damage to the most delicate carpet. The nozzle is adjustable to suit any height of pile.

Twin castors are fitted to give greater stability, whilst the streamline casing is protected by a rubber bumper.

Supplied in standard voltage ranges 100/110, 200/220 and 230/250 V, the "46" cleaner is covered by written guarantee. A kit of standard accessories is supplied if specially requested.

TRADE PUBLICATIONS

METAL TREATMENT.—April issue of the monthly news sheet "The Bonderizer," issued by the Pyrene Co. Ltd., metal finishing division, Gt. West Road, Brentford, Middx., has a note on Vidor's new fluorescent hand lamp.

ELECTRIC FURNACES.—A new folder issued by Birlec Ltd., Tyburn Road, Erdington, Birmingham 24, illustrates a large number of furnaces from the company's range.

LIGHTING FITTINGS.—Latest catalogue from Falk Stadelmann and Co. Ltd., 91 Farringdon Road, London E.C.1, No. 792-52, gives details of the outdoor, industrial and display lighting equipment which the firm produce.

FLEXIBLE CABLES.—First catalogue of flexible cords produced since before the war by W. T. Henley's Telegraph Works Co. Ltd., 51 Hatton Garden, E.C.1, covers the range of CMA and medium insulation flexible cords, as well as heat-resisting flexible cords and motor-car cables.

RECTIFIERS.—New 36-page brochure (N.110) issued by Nevelin Electric Co. Ltd., Purley Way, Croydon, Surrey, describes in great detail the rectifiers and auxiliary equipment which the company supplies.

FLAMEPROOF FILLINGS. — New specification folder featuring flameproof conduit fillings, has been issued by Simplex Electric Co. Ltd., Broadwell, Oldbury, Birmingham. Serial No. is F.L.1834A.

FLUORESCENT LIGHTING. — Leaflets recently issued by Wades (Metal Spinners) Ltd., Arden Works, Fenton Road, Halifax, describe the fluorescent-lighting fillings supplied by the company.

CABLES.—Mass-impregnated non-drawing cables are featured in new catalogue 308, issued recently by B.I. Callender's Cables Ltd., Norfolk Hse., Norfolk Street, London W.C.2.

ALUMINIUM AND ALLOYS.—The "Little Black Book"—"Specifications for Aluminium and Aluminium Alloy Products"—has reappeared in a new edition; it will prove very useful to all concerned with the handling of these materials. Copies are available from Northern Aluminium Co. Ltd., Banbury, Oxfordshire.

NEW LITERATURE

Cathode Ray Oscillographs

by J. H. Reyner, B.Sc., D.I.C., M.I.E.E.

FIRST published in 1943, this work on cathode ray oscillographs has met with wide approval. In this, the fourth edition, the main sections dealing with the fundamental basis of the instrument have been left largely unchanged. The section dealing with special applications has, however, been considerably enlarged to cover some of the more modern techniques.

Although the book is not comprehensive, in that the many tube variants and detailed circuit arrangements are not dealt with at length, it nevertheless provides a sound grounding in simple language of the oscillograph and its uses. Published by Pitman, 199 pp., 4½ in by 7½ in, Price 15s.

Principles of Alternating Currents

by W. Sluckin, B.Sc.

IT is an essential feature of the admirable series of books on electrical engineering which the Cleaver-Hume Press publishes, that they compress a lot of information into little space. In the third of the series, which is now under review, that process seems to have been carried rather too far. The whole range of a.c. technology on the power side is presented, and it is rather difficult to see how a student is to learn usefully if he is introduced to elementary trigonometry in a couple of pages (19, 20), and to the basic ideas of vectors (43), and by page 202 is expected to appreciate the transmission-line diagram. This over-compression is the more unfortunate because some of the purely descriptive matter is well presented. Published by Cleaver-Hume Press, 320 pages, 7¼ in. by 4¾ in. Price 10s. 6d.

Fault Calculations

by C. H. W. Lackey, B.Sc., M.I.E.E.

THOROUGHNESS is the particular characteristic of this volume, which should commend it both to the student in search of a sound exposition on short-circuit calculations, and the transmission engineer who needs a reference book handy to refresh his memory. Mr. Lackey does much of his best work in the early chapters, where his notes on the use of vectors and of vector algebra are refreshingly presented with close attention to practical applications and to a clear understanding of assumed conventions. This care in revealing assumptions liable otherwise to remain implicit is continued in the chapters that cover network reduction and balanced faults, symmetrical components, and special problems of power-system performance under fault conditions. One intermediate chapter, if anything, improves on even this high standard: the discussion of the impedance of power-system components, with particular reference to the three sequence circuits, should be exceptionally valuable to all who come afresh to these matters. With its last chapter on network analysers, and its valuable collection of appendices summarising important formulae and typical values added to its other contents, this volume must rank very highly amongst the growing number of works covering fault calculations. Published by Oliver Boyd, 296 pages, 8½ in. by 5½ in. Price 30s.

The Engineer Directory and Buyers' Guide

THE 1952 edition of this handy little volume should prove most useful. As before, it comprises lists of firms in the engineering industry, with their addresses, telephone numbers, trade names, telegraphic addresses, etc., and includes a helpful classified buyers' guide, but, of course, the information has been brought up to date. Some particulars of relevant associations are also given. Published by *The Engineer*, 442 pages, 8½ in. by 5½ in. Price 5s.

BOOKS RECEIVED

Television Principles and Practice, by F. J. Camm. General review for the amateur and the student. Published by Newnes, 215 pages, 8½ in. by 5½ in. Price 25s.

Mathematics Queen and Servant of Science, by E. T. Bell. Popular review of the development of mathematics. Published by G. Bell and Sons, 437 pages, 8 in. by 5½ in. Price 21s.

Terminology of Cost Accountancy. Complete revision of a widely used glossary of terms presented as first step towards a terminology covering the field of Management Accounting. Published by the Institute of Cost and Works Accountants, 63 Portland Place, London W.1. 24 pages, 9 in. by 6 in. Price 2s. 6d.

The Accountancy of Changing Price Levels. States the problem, and suggests the manner in which information concerning the effect of changing price levels on the maintenance of real capital may be presented. Published by the Institute of Cost and Works Accountants, 63 Portland Place, London, W.1, 24 pages, 9½ in. by 6 in. Price 2s. 6d.

Clean Milk, by H. Hill. Dairy technique, with notes on electrical appliances. Published by H. K. Lewis, 115 pages, 7½ in. by 4¾ in. Price 7s. 6d.

The Welding, Brazing and Soldering of Copper and its Alloys. Describes all major processes involved in some detail. Published by the Copper Development Association, Kendalls Hall, Radlett, Herts, 188 pages, 8½ in. by 6 in. Gratis.

Industrial Magnetic Testing, by N. F. Astbury. Analytical examination of methods of magnetic testing. Published by The Institute of Physics, 47 Belgrave Square, London S.W.1, 132 pages, 9½ in. by 6 in. Price 25s.

Welding Review Year Book, 1952, ed. by J. V. Brittain. Technical notes and a buyer's guide. Published by Engineering Trades Ltd., 26, Holborn Viaduct, London, E.C.1. 308 pages, 7½ in. by 4½ in. Price 9s.6d., postage 6d.

Interference from Refrigerators

Findings of the P.M.G's Advisory Committee

THE Postmaster General's Advisory Committee on Wireless Interference from Refrigeration Apparatus, which was appointed to sit under the chairmanship of Dr. F. T. Chapman, as announced in the House of Commons on July 26, 1950, has presented its report. The terms of reference covered the abatement of interference with reception in both the sound and television wavebands caused by the various types of refrigeration apparatus.

The committee's recommendations for limits of permissible interference from refrigeration apparatus are based on the assumption that reasonable precautions will be taken to minimise the susceptibility to interference of receiving installations. It is considered unnecessary to specify requirements in terms of the direct radiation of interference energy. The main recommendation is that the voltage of interference from refrigeration apparatus injected for continuous periods of not less than 1/5th second, or more frequently than once in any two-second period, into the electricity supply mains, measured in the manner and with the apparatus described, should not exceed 1,500 microvolts for the waveband 200-1,605 kc/s (the major part of the broadcast band) or 750 microvolts for the waveband 40-70 Mc/s (the present television band).

The committee recommend that these requirements should be specified for both new refrigeration apparatus and for that in use. They understand that, at the present time, suppressors are fitted by reputable manufacturers to new refrigeration apparatus as required, and they observe that compliance with the requirements is implicit in observance of the latest British Standards for household refrigeration apparatus.

Course for Plant Engineers

RECENTLY the Incorporated Plant Engineers have shown themselves to be very much alive in their corporate activities. The latest evidence of this is a booklet issued this month suggesting an education scheme which will lead to the qualifying examination for associate membership of the I. Plant E.

The course suggested has a six-year basis, the first three years of which will be devoted to Ordinary National Certificate in either mechanical or electrical engineering. Possession of O.N.C. grants exemption from Section A of the qualifying examination. Section B of the examination covers the theory and practice of electrical energy, generation and distribution; mechanical energy generation; mechanical power distribution and English.

In their fourth year holders of O.N.C. will work up their knowledge in the branch of engineering in which they have not specialised; mechanical engineers will study the principles of electricity and either workshop technology or applied heat, while electrical engineers will give their attention to these last two subjects. The fifth and sixth year will be devoted to the three main subjects of Section B of the examination.

In the electrical section, the section B syllabus for the fifth year covers circuit calculations, electric machinery, alternators, the three-phase induction motor, generation and distribution, together with statutory safety regulations and methods of maintenance control. Many of these subjects are repeated in the sixth year, but additional matter treated the breakdown of insulation, overheating and mechanical troubles, industrial furnaces, illumination and ventilation. There should also be attention to the drawing-up of specifications for electrical apparatus and equipment.

It is emphasised that the syllabus should be treated from the viewpoint of the plant user seeking efficiency under running conditions and not from that of the designer and manufacturer. The course should be descriptive and practical rather than mathematical.

Syllabuses in the other subjects have the same attitude, and cover internal combustion engines, steam raising plant, steam engines, and compressors; mechanical and steam transmission plant; pumping and hydraulic plant, and refrigerators.

Associate Members of the I. Plant E. are required, in addition to passing the examination or possessing an exempting qualification, to be 25 years old and to have been engaged for at least two years in a position of responsibility. Further details are available from the Secretary, 48 Drury Lane, Solihull, Birmingham.

The WEEK in NEWS

Shorter Contract Form Prepared

New Model Form to help Small Engineers

IT was stated last week that a shorter Model Form of General Conditions of Contract has been prepared by the joint committee on the matter of the Institution of Mechanical Engineers and I.E.E. It will be known as "Form A1.SF—Home Contracts, with Erection (Short Form)" and has been published under the authority of the Councils of the two Institutions.

The new form is a shorter and modified version of Model Form A. It has been designed for contracts for which a minimum of site engineering work is involved and for which the purchaser does not employ an independent engineer to exercise the powers given to him by Model Form A. The shorter form does not disturb the equities between purchaser and contractor, and for many smaller contracts it will probably take the place of separate conditions now used by individual contractors and purchasers. It is hoped that this measure of unification will be of use in the placing of smaller contracts for which Model Form A might be considered too lengthy.

Copies of Model Form A1.SF are obtainable from the secretaries of either Institution and cost 4s. including postage.

Clock Makers Set 40% Export Target

IN common with other manufacturers' associations the British Synchronous Clock Conference found that the shortage of raw materials and economic position generally made trading conditions difficult. In his report for 1951, the chairman, Mr. H. A. Knox, referred also to increases in costs of materials and labour. These had been borne mainly by the industry he said.

Commenting briefly on the subject of exports, Mr. Knox referred to import restrictions, frequency variation in certain countries, and the chief problem, the raw material shortage. The export target for this year is to be 40%.

Electricity and Lloyds

AT the end of 1951 there were over five million tons gross of turbo-electric steamships in the world and nearly 200,000 tons of diesel-electric ships. These figures are given in the annual report of Lloyds Register of Shipping, which puts the total of world tonnage at 87 million tons.

At the end of 1951, the report notes, work in hand to Lloyds Register included electrical installation totalling 125 MW. Non-marine activities of the Register included the inspection of two new hydro-electric power stations in Tasmania, and the inspection and testing during manufacture of the equipment for the transmission systems with which the stations are associated

EDMUNDSONS ACQUIRE SLOAN ELECTRICAL

IT was announced last week that the well-known electrical wholesale distributors, Sloan Electrical Co., Ltd., has been acquired by Edmundsons Electric Co., Ltd. As a member of the Edmundson Group, the newly acquired company will continue to trade as an independent unit from each of its nine branches in England and Scotland. These are situated at Vauxhall, Leyton, Ealing and Peckham, in London, and also at Manchester, Bristol, Exeter, Edinburgh and Truro.

Mr. Norman Robertson is to remain chairman of Sloan Electrical, and Messrs. J. MacNish, F. D. Pratt and A. H. Young, who are directors of Edmundsons, have joined the Sloan board of directors.

It may be remembered that Edmundsons entered the wholesale business at the beginning of 1949 and at that time acquired the firm of Simpson, Baker and Co., Ltd. Since that date they have also taken over Alliance Wholesale Co., Ltd. Prior to the nationalisation of the Supply Industry, readers may recall that Edmundsons owned a number of electricity supply undertakings.

The First Half-Century

Paris is trying to meet the difficulty of transport for its more remote suburbs by running electric omnibuses. These differ from the usual type of such vehicles in carrying no batteries. The motors driving the 'buses take their supply of electrical energy from overhead wires, a self-propelling trolley travelling at a regular distance in front of the 'bus and thus overcoming the difficulties which have hitherto prevented a vehicle not running on fixed rails from being successful for road service. The trolley is arranged with a three-phase motor, the current for which is transformed from a direct current in the main motors driving the omnibus. The trolley regulates its speed to that of the 'bus, and it is provided with a flexible cable, thus enabling the vehicle to pass from one side of the road to the other and allowing other traffic to be passed.—*From our issue of April 10, 1902.*

Radio Exports Still Rising

BRITISH exports of radio equipment continue to rise month by month in spite of the demands made upon this section of the industry by the defence programme. We note that during February the total value of these exports was £2,136,000, bringing the calculated annual rate well above that of 1951.

All four sections of the radio industry showed substantial increases during January and February over the corresponding months last year. The totals of all sections amounting to £4,293,000 this year against £2,804,000 in the first two months of 1951. Impressive as these figures are, no account has been taken of indirect exports installed in ships and aircraft or components in other apparatus.

TRUST COMPETITION ON NAVIGATION

ANNOUNCEMENTS concerning awards for 1951 and intended contest for 1952 in respect of the Thomas Gray Memorial Trust which provides prizes for the improvement and encouragement of navigation, have been made by the Council of the Royal Society of Arts.

The subject of this year's 7,500 word essay is "The future development of the Cargo Liner, with special reference to construction, tonnage, capacity, power unit, speed, general economy and complement." A prize of £50 is being offered for the best essay. A similar award will be made for a deed which is of outstanding professional merit. The competition is open to members of the British Merchant Navy.

Last year's prize has been given to Mr. J. Holme Dickson, of Teddington, Middlesex. No prize was awarded for a Deed of Professional Merit as none was considered sufficiently outstanding.

The newly lit canteen for executives of the Merseyside and North Wales Electricity Board

Daylight at night in Basement Canteen

THE executives' canteen of the Merseyside and N. Wales Board has been the site of a recent lighting installation planned by the British Thomson-Houston Co., Ltd. Despite the apparent superfluity of pillars, the overall effect is one of unusual brilliance and it is to be noted that the planners have made full use of lighting reflected by wall mirrors. All the fittings were supplied by B.T.H. and, as might be expected, the installation was carried out by the Board itself.

Eleven fluorescent twin-lamp fittings with fluted "Perspex" side panels have been mounted on the ceiling, while on the walls between the large mirrors 17 single-lamp units with translucent "Perspex" covers have been fitted. The canteen is situated in a basement and in an effort to give the appearance of daylight at night-time, an additional four corrosion-resisting plastic fittings, each housing two 5 ft 80 W lamps, have been installed outside two of the windows.

OFFICIAL PUBLICATIONS

NON-FERROUS METALS PRICES (No. 9 Order) (Amendment No. 2) ORDER, 1952. H.M.S.O. 2d.

ALUMINIUM SCRAP PRICES ORDER 1952. H.M.S.O. 3d.

MINES AND QUARRIES FORM No. 58. H.M.S.O. 6d. *Parts of abstract and regulations required to be supplied to electricians and assistant electricians.*

BRITISH STANDARDS.
B.S. 1845: *Filler Alloys for Brazing (silver solders and brazing solders).*

B. S. 232: *Vitreous-enamelled Steel Reflectors for use with Tungsten Filament Lamps.*

WATERMILLS FOR POWER GENERATION

A SUGGESTION that watermills be used to generate electricity has been forwarded to the Ministry of Fuel and Power by the Society for the Protection of Ancient Buildings. The society feels that the situation is such as to demand the utilisation of all available power, particularly power obtainable without the consumption of coal or imported oil fuel. Hitherto, the measure had not been an economic proposition.

We understand that the Ministry has told the society that they are interested and have asked for further information as to the number of mills suitable for adaptation.

New Power Rates for Trams in North

NEGOTIATIONS which have taken place between the Municipal Passenger Transport Association and the Area Electricity Boards in Yorkshire and Lincolnshire have resulted in a standardised rate for power supplies to trolleybuses. The new rate for h.t. power is about 0·925d. p.u., to which is added the cost of conversion to local pressures, about 0·3d. p.u. As reported in our March 27 issue, this is likely to save Bradford some £30,000 a year.

In Leeds, however, it is rather a different story. There, the new rates are likely to put an additional £34,000 a year on the cost of running the Corporation's trams. It is hoped that this and other increases in wages and the price of fuel will be offset by the rise in tram and bus fares.

Other news concerning trams comes from Sheffield and London. In the former city, replacement of trams by buses is to be deferred due to the heavy cost of the change. The changeover, it was stated, could not be justified in the country's present financial state, and the conversion or part of it at least may be postponed for a year.

In London, where conversion from trams to buses has been going on for some 18 months, the changeover is to be completed on July 6 instead of in October as previously envisaged.

DERWENT POLLUTION

INJUNCTIONS against the B.E.A. (E. Midlands Div.), British Celanese Ltd., and Derby Corporation were granted by Mr. Justice Harman but suspended for two years when the question of the amount and apportionment of damages in the River Derwent pollution case was argued further last Monday. Details in the action were reported previously in our April 3 and February 21 issues.

Mr. Henry Salt, Q.C. for the B.E.A., said at least 4 years would be needed to deal with the question. The cost of converting Longdon power station to a self-contained cooling system would be over £400,000. Referring to the return of water to the Derwent after use he said that if the Authority were driven to comply with an injunction which allowed no latitude in temperature, the station might have to close down. An inquiry has been ordered as to damages to be awarded. Costs were awarded to plaintiffs.

MOTORS SINCE 1904

A COLOURFUL little booklet which cannot fail to catch the eye has been produced by Brook Motors Ltd. The innumerable small motors depicted on the front cover issuing conveyor-belt fashion from the works is indicative of the substantial progress made since Sir Ernest Brook started work in Threadneedle Street in 1904.

Sundry little charts show the steady increase in the rate and volume of production and the growth of the company's factory. The many illustrations clearly present an excellent picture of the works itself, the conditions of the workers and the vast extent of business both at home and overseas.

Works Managers' Essay Competition

THE Council of the Institution of Works Managers has announced its Essay Competition for which prizes of £100 and £75 are offered. The Competition has been divided into a senior grade for persons between 30 and 35 and a junior grade for those under 30. Subject for the essay is "What are likely to be the Structure and Problems of Works Management in 1977?" Closing date is Sept. 30.

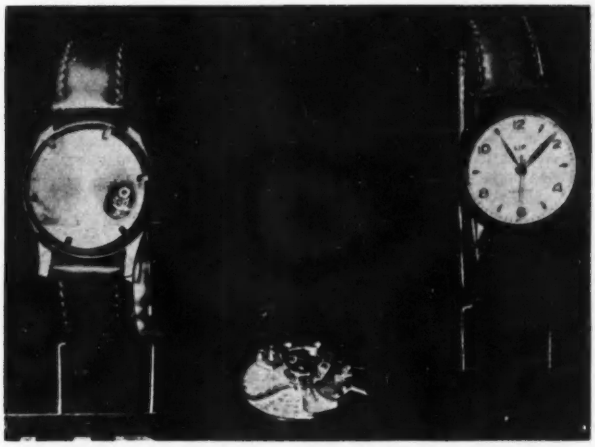
It is also announced that the final examinations of the Institution will be held on May 20.

500 MEMBERS IN THREE YEARS

AT the third annual meeting of the Engineer Buyers' and Representatives' Association, held recently, the Lady Tweedsmuir and Sir Patrick Hannon were adopted as hon. vice-presidents. Sir Herbert G. Williams was re-elected president for the third successive year.

In his report, Sir Herbert stated that membership had topped the 500 mark.

France and the U.S. are believed to be the first countries to produce an electric wrist watch. The one photographed below has been developed after five years of research and was made by the Lip Watch Co. of Besancon, France. The tiny motor can be seen in the centre. One manufactured by the Elgin National Watch Co. (U.S.) houses a battery ¼ in. long



NEWS FROM E.A.W. BRANCHES

21st Birthday

HALIFAX became the nineteenth branch of E.A.W. to celebrate its 21st birthday a short time ago. Present on that occasion were the town's mayor and mayoress (the latter, Mrs. A. Pickles, being branch president), and Dame Caroline Haslett who, replying to the toast, "The E.A.W. 21st Birthday," criticised the imposition of purchase tax on household appliances.

Domestic electrical appliances were not luxuries, said Dame Caroline, and when the present Government settled down, the Association would be tackling them on the removal of P.T.

Campaign against P.T.

Speaking also at the Brighton and Hove branch's luncheon on the same subject, Dame Caroline threatened to lead a militant campaign against "reactionaries" who said luxuries such as electrical appliances should not be introduced in the home, if they tried to sway the Government.

Attract Girls to Industry

At the annual meeting of the association's Woolwich branch, it was reported that special efforts were being made to interest girls in the many careers open to them in the electrical industry. Members expressed the hope that Miss Taylor, the Youth Employment Officer, would be able to interest school leavers. A closer liaison with secondary schools was suggested.

Tariffs to be kept Stable

Speaking at the annual lunch of the Birmingham branch recently, Ald. W. S. Lewis, chairman of the Midlands Board, told E.A.W. members that domestic and commercial tariffs in that area were the lowest in the country, and lower than it was before the war. A unit now cost 1.02d. compared with 1.112d. in 1938. Ald. Lewis added that they were trying to hold tariffs as they are and balance higher costs by increased sales of appliances and by increased efficiency.

MORE EXHIBITORS AT INVERNESS

READERS will recall the note in our March 27 issue concerning the two electrical exhibitions which are to take place at Inverness between April 7 and 12. We reported on that occasion a number of exhibitors who were taking part in the Electrical Economy Exhibition, but we continue to receive information from intending exhibitors.

Two detailed models will be prominent on A. Reyrolle's stand. One will be of a section of the 132 kV switching station at Fort Augustus, and the second of a metalclad horizontal-draw-out circuit-breaker panel. Three types of domestic appliances, designed to bring efficiency into every household, are to be displayed on the English Electric stand; they are the 76A refrigerator, the 2009D cooker, and a washing machine. The company is also showing the part its hydro-electric plant and distribution equipment is playing in the development of water power in Scotland. Other exhibitors include Johnson and Phillips, Ltd., and the Harland Engineering Co., Ltd.

Lord Citrine presenting the Challenge Trophy to the winning men's team following the B.E.A. National First-Aid Contest

B.E.A. National First-Aid Contest

AS in previous competitions in which B.E.A. first-aid teams have taken part, candidates from Sussex did exceptionally well in the latest National Competition of the Authority's Ambulance Centre which took place in London last week. Winners in both the men's and women's sections came from that county.

Challenge trophy in the men's section was won by a Worthing team which was representing the S.E. District. Their opposite numbers in the women's section were the mid-Sussex team. These successes follow those last November in the second annual contest, when the Worthing (men) and Sussex (women) teams carried off the Centre's trophies in the contest held at Porchester Hall. Competing again later the same month in a contest organised by the St. John Ambulance Association they were placed fifth and fourth respectively.

Runners-up in this, the Centre's third annual competition, came from London and the Midlands (Halesowen) in the men's and women's sections. The close proximity of the 1951 and 1952 competitions is due to the fact that it has been decided to bring the meetings forward to the early part of the year.

Consumers Paying Too Little!

THE view that consumers are not paying enough for electricity is certainly not a common one and some eyebrows may be raised at the knowledge that such an opinion has been voiced. Nevertheless, this attitude was expressed at a recent meeting of the S.W. Scotland Consultative Council. The member concerned amplified his view by saying that in a short time the Council would be asked to consider further increases in tariffs.

A proposal that consumers in the Glasgow-Rutherglen district should be charged an extra 1d. p.u. instead of ½d. (as announced last month) was defeated. It was suggested that the district's rate should be raised to 4d. as those consumers should pay the same as others in the Board's Area and thus standardise charges. On the other hand, it was argued that Glasgow consumers who had received supplies at cheaper rates than others in the country would be unduly penalised. They had already sustained increases higher than other sections of the community.

The council approved the increased tariffs which will become operative on June 1.

Heenan & Froude Golden Jubilee

TO mark their golden jubilee, which took place at the end of March, Heenan and Froude Ltd. have produced a most becoming spirally bound brochure. A large-sized publication, text and pictures have been printed on alternate pages and the normal black and white setting has been placed in grey borders. Historical background and details of present-day production are dealt with briefly in its 20 pages. Copies are being distributed to shareholders and friends.

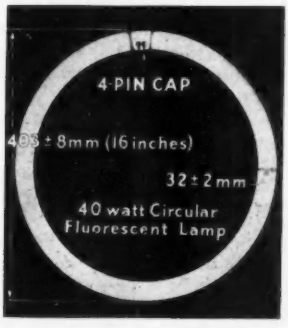
Power Station Pumps

IN our summary of Mr. R. Pennington's Paper on "Centrifugal Pumps in Steam Power Stations," we inadvertently stated that the energy to be imparted to the feed water was proportional to its specific gravity. We have been asked by Mr. Pennington to point out that under the circumstances discussed in the paper, the energy to be imparted was, in fact, "inversely proportional to its specific gravity."

Committee of B.S.I. is One Year Old

A FIRST birthday which passed almost unnoticed was that of the Women's Advisory Committee of the British Standards Institution. In the short time since the committee began to function, they have more than proved their worth and have now become indispensable in presenting the women's views.

Membership of the committee consists of representatives of the nineteen national women's organisations, and included among these is the E.A.W. who elected Miss V. Norvick to serve on the committee. Although their work in the electrical field may not be deemed the most outstanding in the year's achievements, it is notable. They considered among the many other subjects the working height of kitchen units, the mechanical shock test as applied to toasters.



The accompanying photograph shows the construction and dimensions of the new circular fluorescent lamp described in our last issue. The colour of this lamp is "Mellow" and not "yellow" as was inadvertently stated in that description

This display piece showing sundry items of flameproof equipment has been produced by Simplex Electric Co. Ltd. for their agents in New Zealand. It includes the new Simplex miniature switchfuse and switchgear conduit fittings and lanterns

Large Loco Order from S. Africa

IT was announced last weekend that the English Electric Co. has received an order for sixty 2,000 h.p. electric locomotives from the S. African Railways and Harbour Administration. The order is said to be worth about £2½ million. The engines, each weighing 77 tons, will operate on the 300 V d.c. electrified lines of the Union.

NEWS IN BRIEF

Cricket and Football sections of Telcon's Social and Athletic Club held their third annual dinner and dance recently.

B.I.C.C.'s Bulletin No. 7 deals with the 750-ft television mast at Kirk o' Shotts, built by them.

Another amateur dramatic society, that of Erskine Heap, made its debut a short time ago with a successful production of the three-act farce "See How They Run."

S. P. Austin and Sons, Sunderland, have completed the collier *Hackney* (2,700 tons), the last of three vessels ordered by the B.E.A.

Several hundred dancers were present at Falk, Stadelmann's annual function, held at the Victoria Halls, Bloomsbury, recently.

Questions in Parliament . . .

Scottish Fuel Efficiency

Sir W. Wakefield asked last week what steps were to be taken to set up a National Fuel Trust as proposed by the Scottish Fuel Efficiency Committee. The Minister of Fuel and Power stated in a written answer that he understood the Scottish Committee to have submitted their ideas to the Committee on National Fuel policy who would consider them. He was awaiting their report.

Production Advisory Council

A number of questions were asked last week concerning the Production Advisory Council presided over by Mr. R. A. Butler. Mr. H. Watkinson wanted to know whether the Chancellor would make greater use of the Council than did the previous Government and try to make it a more flexible and efficient instrument for increasing production. Mr. Butler said it was certainly intended to use the council and another meeting had been arranged.

Mr. Gaitskell then asked about the changes made in the council's secretariat which he alleged had not been notified to the T.U.C. or employers. The Chancellor pointed out however that the changes made in the interests of economy had been explained to the T.U.C. and employers. He doubted if they would make any difference.

Industrial Productivity

In a written answer last week, Mr. H. Strauss explained that the Board of Trade had taken over certain co-ordinating responsibilities in the field of industrial productivity. They were now responsible for the grant made to the Anglo-American Council on Productivity and would deal with such Government action as may be required for furthering American technical assistance and co-operation among Western European countries.

Plant Hire Charges

In regard to charges payable for the hire of plant by contractors, the Minister of Works stated in a written answer that statutory control of plant hire rates were being reviewed to see if they could be discontinued. A decision would be reached shortly.

Lighting in the Commons

Mr. I. O. Thomas asked the Minister of Works whether lighting in the Members Tea Rooms at the Palace of Westminster could be improved. Mr. Eccles replied that a long-term scheme was in hand for the improvement of lighting throughout the Palace.

Wireless and T.V. in the North East

Mr. David Gammans told the House there was no immediate prospect of a T.V. station at Pontop Pike so long as restrictions on capital investment remained. So far as sound broadcasting was concerned the number of medium waves allotted to this country were not sufficient to allow a separate wavelength for the north-east. He added that the area would receive priority both for a T.V. and a V.H.F. sound station as soon as was practicable.

Capt. L. P. S. Orr asked if a transmitter could be built at Stagshawe on the same wavelength as Holme Moss and give N. Ireland its own frequency, solving all the trouble there. Mr. Gammans said he understood that was not practically possible as it would produce what was known as a mush area in Durham. Asked whether other regions could share a wavelength to make one available for N. Ireland and the N.E. coast, he said there was no satisfactory way out of the problem, with the shortage of wavelengths, except on the V.H.F. system.

T.V. Suppressors

A regulation governing the fitting of interference suppressors to motor-cars was being prepared, Mr. David Gammans assured the House recently. Pressed as to when the order would be issued, Mr. Gammans said as it was a technical matter it was to be referred to the Advisory Committee. He was further asked whether, as many new cars were already being fitted with suppressors, the new order could be extended to cover any such cars not already fitted. The P.M.G. was trying to see to what extent this could be done by propaganda—there was no reason to be dissatisfied with results made public.

Power Cuts

At question time in the House recently, the Minister of Fuel and Power told members that there had been four power cuts this winter, compared with 16 in the winter of 1949-50.

Census Results

Detailed results of the Census of Distribution for the retail trade were expected to be ready this year, stated Mr. H. Strauss last week. Volumes dealing with the service and repair trades and for the wholesale trade would follow soon afterwards.

Capital Formation Expenditure

Questioned on estimated capital formation expenditure this year for the nationalised coal, gas, steel, electricity and transport industries, Mr. R. A. Butler said he did not propose to publish a detailed estimate in view of the uncertainties of the economic situation. Ceilings for investment had been laid down. It was possible, he said, shortages of materials may prevent those totals being attained.

Owen Falls Exhibition

Following his statement (see these columns last week) regarding an exhibition in Westminster Hall on the Owen Falls scheme, Mr. Oliver Lyttelton has told the House that such a display of informative material had been assembled. It would be on view until the Easter recess.

The debate on the Private Members Bill empowering the B.E.A. to construct H-E. schemes in N. Wales has been reported on page 660.

Electric Supply News . . .

Easington (Co. Durham)

Representatives of many parish councils in the Easington area have decided to approach the Durham Coal Board for a reason for the disparity in electricity charges from the Board's electricity system in various villages. It has been complained that rates at Horden, Blackhall and East Murton are 7d. a unit and in other parishes only 4d. or 1d. a unit. Representatives of Blackhall stated that householders had to use 200 W lamps in the houses to get sufficient light, and the street lighting was vile. It was suggested that the Coal Board was waiting for the North Eastern Electricity Board to take over the electricity system in the district, and meanwhile the Coal Board was unwilling to spend money on improving the supply. The parish councils concerned have decided that if no satisfaction is received, the matter should be continued at a higher level.

Gravesend

The Town Council is viewing with concern the proposed erection of a generating station at Tilbury opposite the Promenade, as they consider that pulverised fuel to be used there might cause a serious nuisance to Gravesend from coal dust. The Council has agreed that the B.E.A. be asked to receive a deputation and that a fuel expert's services be engaged to advise the Corporation as to the possible nuisance that might be caused by the fuel.

Gt. Yarmouth

After studying proposals for the construction by the B.E.A. of a new power station at the South Denes, Yarmouth Port and Haven Commissioners' consulting engineers have expressed the opinion that none of the proposed works will have any detrimental effect on the harbour. Dealing with the cooling water intake, they say that the quantity of water taken from the river will not inconvenience the navigation of passing vessels. With the present condition of the harbour, the effect of taking off the water for cooling purposes may be an advantage, while they also consider the outfall proposals for the cooling water discharge will not be detrimental In a reference to the coaling berth, the consulting engineers say that provision has been made for reconstructing the quay wall for a length of 1,415 ft. In their opinion dredging proposals will not cause excessive silting, especially as there will be an almost constant stream of colliers berthed at the quay. To leave the harbour bed at its present levels would be most inconvenient to the power station authorities as at low tide the colliers would sit on the bottom and lean outwards from the quay wall.

Isle of Skye

The Storrs Loch hydro-electric scheme, Isle of Skye, is to be officially opened during Skye Week, May 23 to 31, it has been stated. The station will house three 800 kW horizontal Francis turbines, supplied by Gilkes and Gordon, coupled to Bruce Peebles alternators. It will supply the whole island which is already linked with the mainland by a submarine cable to Kyle of Lochalsh.

North Western

The North Western Electricity Board is to introduce as an experiment in two areas of the Lake District, a scheme for payment of electricity bills in easy stages, to avoid that end-of-the-quarter electric shock of which some consumers have complained. From the electricity showrooms consumers will be able to buy special 2s. 6d. stamps towards their quarterly bill. If the experiment is successful, it will be extended throughout the Board's area. The Consultative Council has been told that the special stamp is being designed, and the system will be introduced as early as possible.

North of Scotland

An extension to the Glen Lussa scheme is proposed by the North of Scotland Hydro Electric Board in its Constructional Scheme No. 68, just published. The extension will increase the output of the Glen Lussa project by about 2,500,000 units annually, it is estimated. Under the new scheme, water will be drawn from the upper tributaries of the River Barr, and this water will pass through a 2¼ mile long tunnel to feed into the reservoir of the main project. The first of two 1,000 kW sets for the Lussa scheme started operating in February last.

LIGHTING SCHEMES

Bradford.—T.C. recommended to approve £4,239 scheme for converting existing gas lighting in the central area of the city to electricity.

Eastbourne.—T.C. has received consent of M.o.T. to improved lighting in Devonshire Place, as a cost of £1,400.

Easington-with-Thorpe.—The Parish Council has adopted a £2,900 scheme for improved lighting at Holme Hill.

Ormskirk.—Application is being made for consent to improved lighting in Aughton Street, Burscough Road and Suare Lane, to cost £3,380.

Southgate.—The T.C. is seeking consent to borrow £8,130 for street-lighting improvements.

Stockport.—The T.C.'s plan to convert all street gas-lighting to electricity has been turned down by the M.o.T., which has suggested an amended scheme.

Tipton.—T.C. recommended to approve scheme, estimated to cost £8,186, for electric lighting in various roads, comprising 170 80-W mercury discharge lamps on 15-ft concrete columns.

Whitby.—R.D.C. to proceed with scheme for 100 street lamps in 12 parishes. Cost £1,260.

Company Activities . . .

Albright & Wilson Ltd.

For 1951, the group profit, after all charges, including taxation, attributable to Albright and Wilson is £754,308 (*£654,361*). The group net profit, after tax, including outside interests, is £815,615 (*£691,061*). U.K. taxation absorbs £741,137 (*£519,657*), and overseas tax £679,070 (*£202,865*).

Associated Electrical Industries Ltd.

The company had to provide £5,400,000 for taxation during the year, Sir George Bailey, chairman, remarked at this meeting. The dividend of 20% for the year might appear a generous return to the stockholders, but in fact it was a very modest one, being slightly less than 4¼% on the total cash they had invested in the business. It is estimated that if the company's profits in 1952 are the same as they were for 1951 the Excess Profits Levy will be about £350,000. Group production in 1951 reached a record total of £61,000,000, while the value of orders in hand stands at £135,000,000. In regard to the Monopolies and Restrictive Practices Commission report on electric lamps, he revealed that a number of the recommendations made have been accepted in principle, and are now under discussion with the appropriate Ministries. The two glass ribbon machines acquired by the new company, Glass Bulbs, Ltd., are now in full production and are making a million bulbs a day, he added.

British Aluminium Co.

Group trading balance for 1951 is £3,404,506 compared with £2,185,435 for the previous year. The final dividend is 6% again making 10%, plus a bonus 2% (*nil*) on the Ordinary capital. After charging taxation, depreciation, etc., the net profit amounts to £808,816 (*£631,999*) of which £17,550 (*£12,578*) relates to outside shareholders. To general reserves £144,696 (*£141,170*), development expenditure £31,240 (*£40,000*), taxation equalisation reserves £109,432 (*£105,662*) and there is £939,381 (*£809,421*) carried forward.

British Insulated Callender's Cables Ltd.

The offer to stockholders, in respect of the issue of 3,109,614 Ordinary shares of £1 each at 22s. per share closes today, April 10. The new shares when fully paid will be converted into Ordinary stock transferable in £1 units, ranking *pari passu* with the existing Ordinary stock, except that holders will not participate in any dividend for the year ended December 31, 1951.

Crofts Engineers (Holdings)

For 1951 the trading profit was £630,707 compared with £659,462 for the previous year. After charging taxation of £385,384 (*£360,314*), the net profit is £245,323 (*£299,148*). The sum of £130,000 (*£150,000*) is transferred to general reserve, £25,000 (*£20,000*) to stock reserve and £5,000 (*£20,000*) to employee's superannuation fund. Preference dividend absorbs £13,125 (*£13,750*). With a final Ordinary dividend of 25%, the dividend is maintained at 40%, absorbing £84,000 (*£88,000*). There is £10,870 (*£22,420*) retained by subsidiaries and £303 (*£573*) by the parent company.

A. Reyrolle & Co.

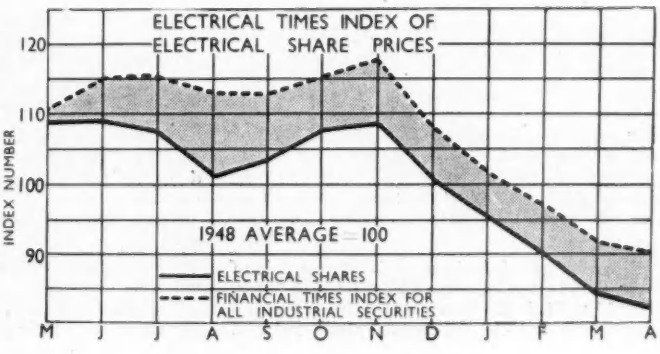
Net profit for the year is £896,898—an increase of £121,403 over the previous period—according to the preliminary statement. A final Ordinary dividend of 6¼% is recommended, payable on the £2,035,294 Ordinary stock as increased by the one-for-one bonus last September. With the interim of 7½%, the total distribution is equivalent to 20% on the old Ordinary capital (distribution for 1950 was 15%).

Dividends Declared

Parmiter Hope & Sugden.—Interim of 7½% (*same*) on capital increased by 40% bonus. But the directors warn this dividend does not imply any intention as to the year's total.

Superheater Co.—Final dividend of 22½% making 32½% for the year.

Compared with the sharp decline in the share price indices since they began to drop at the end of October last, the fall appears to have been arrested. Figures for both industrial shares as a whole and electrical shares in particular fell again last month, however. The "Financial Times" index for all industrial shares dropped from 93·9 to 90·3, while the "Electrical Times" figure fell by 2·1 to 82·3. Figures are based on average prices during 1948.



Commercial Information

CONTRACTS OPEN

HOME

April 11.—West Lothian. Electrical work in erection of 32 houses at Dalmeny, 42 at Uphall and 16 at Livingston Village. Applications by above date to John Calder, County Clerk, County Buildings, Linlithgow.

April 12.—Aberdeen. Electrical work at Turriff Academy. Documents from James Munro, architect, Deveron Rd., Turriff.

April 12.—Belfast. Modifications and additions to electrical installation at Royal Belfast Hospital for Sick Children. Consulting Engineers are F. W. Parkinson and Partners, 6 Murray St. Deposit £3 3s.

April 14.—Glasgow. Supply of electric cables, etc., required by office of public works during year beginning June 1. Applications to that office, Room 81, City Chambers.

April 14.—Selkirk. Electrical work in erection of school at Gala Policies, Galashiels. Contact J. and J. Hall, chartered architects, Ladhope Vale, Galashiels.

April 14.—Wakefield. Supply and erection of twenty-one 25-ft. concrete columns mounting mercury vapour lanterns for street lighting in Barnsley Rd. City Engineer, Town Hall.

April 15.—Belfast. Supply and erection of earth leakage trip switches, earth electrodes and wiring in 185 houses and 10 flats on Mount Vernon estate. Education Architect, Academy Street.

April 15.—Seaton Valley (Northumb) U.D.C. Supply of electrical goods for 156 houses to be built this year. Surveyor, Council Offices, Seaton Delaval.

April 16.—Newtownards (Down) R.D.C. Electrical installation in erection of 84 houses at Comber. Surveyor, 2 Glenford Place. Deposit £2 2s.

April 16.—Sedgley U.D.C. Proposed street lighting scheme on Ettymore (North) estate includes provision and erection of 33 columns, 60 W tungsten filament and 80 W mercury vapour lighting equipment. W. M. Jones, Engineer and Surveyor, The Limes, Dudley Road.

April 17.—Belfast. Installation of electric lighting in gymnasium at Graymount intermediate school. Education Architect, Academy Street.

April 18.—Edinburgh. Electrical installation in reconstruction work at 82-84 Canongate. City Architect, City Chambers.

April 18.—Manchester. Supply of electric machines and machine tools for metal work and woodwork rooms at St. Columba's R.C. school. City Architect, Town Hall. Deposit £1 1s.

April 19.—Swansea T.C. Electrical installation at West Penlan primary school. Applications by above date to Borough Architect, The Guildhall. Deposit £2. (Advertised in this issue.)

April 21.—Birmingham. Electrical installation in 12 blocks totalling 236 flats, and supply and erection of 14 lifts at Ward End Hall estate, St. Margaret's Ave. Documents from H. J. Manzoni, city engineer and surveyor, Civic Centre. Deposit £2 2s.

April 21.—N. Ireland. Installation of a.c. distribution mains, switch and metering gear, and emergency d.c. supply in N.I. Fever Hospital, Purdysburn. Consulting Engineers, F. W. Parkinson and Partners, 6 Murray St., Belfast. Deposit £3 3s.

April 23.—Co. Down. Electrical installation at Kilkeel primary school. Architect, D. W. Boyd, 43 Scottish Provident Buildings, Wellington Place, Belfast. Deposit £5 5s.

April 25.—Belfast. Supply and erection of (*a*) road transport weighbridge (30 tons), tender No. N.1054; and (*b*) two sets of condensate chemical treatment plant for turbo-alternators, tender No. N.1174. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. in each case. (See March 27 issue.)

April 29.—Hawick T.C. Electrical installation in erection of 20 houses at Burnfoot. Documents from Burgh Surveyor, Town Hall.

April 30.—Bournemouth T.C. Rewiring at Portchester secondary boys' school. Borough Architect, Town Hall. Deposit £1 1s.

May 3.—Leigh T.C. Complete installation of (a) 2·24 miles of Group A mercury vapour lighting on concrete columns; (b) 0·24 miles of Group A fluorescent lighting on concrete columns; and (c) 0·6 miles of Group A mercury vapour lighting on trolleybus poles. Borough Engineer and Surveyor, Town Hall.

May 7.—Gateshead T.C. Electrical installation in new £90,000 offices for Borough Treasurer's Dept. on Shipcote site. H. J. Cook, chief architect, Municipal Buildings. Deposit £2 2s.

No date stated.—Bangor. Electrical work in 80 houses. Particulars from Charles Hutchinson Estates, Head Offices, Ardmore Ave., Finaghy.

No date stated.—Inverness. Supply of electric lamps for year beginning April 1. Applications to E. W. M. Watt, secretary and treasurer, Board of Management for Inverness Hospitals, Muirfield Hospital.

No date stated.—N. of England. George Wimpey and Co., Ltd., invite applications from firms desirous of being placed on list for sub-contract work in Lancs, Yorks and Cheshire. Inquiries to company at 629 Eccles New Rd., Salford 5.

No date stated.—Renfrew. Electrical work in erection of 30 houses at Newton Mearns, 20 at Thornliebank and 32 at Kilmacolm. Offers immediately to County Engineer, 16 Back Sneddon St., Paisley.

No date stated.—Trimdon (Dur.) R.C. Supply and installation of 27 mercury vapour discharge units of 80 W type complete with 15 ft. columns on Central housing estate. Particulars from Clerk, 9 Cleveland Ave., Trimdon.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076. Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

April 23.—India. Municipal Commissioner for Greater Bom-

bay calls for tenders for four portable double operator diesel engine-driven welding sets. Forms (Rs.3) from Hydraulic Engineer, Bombay Municipality, 7 Napier Rd., Fort, Bombay 1. B.o.T. (Ref.: CRE 11576/52)*.

April 23.—New Zealand. Post and Telegraph Dept., Wellington, invites tenders for supply of 1,000 capacitors, 0·5 mfd and 0·5 mfd, B.P.O. No. 94, Mark II. Director General (Stores Div.), G.P.O., Wellington. B.o.T. (Ref. CRE 11934/52).*

April 24.—Greece. Supply of 31 electric sterilisers for 220-380 V to various specifications for Greek Social Insurance Inst., 22B Churchill St., Athens. B.o.T. (Ref. CRE 11811/52).*

April 28.—Canada. Supply of engine generator required by Saskatchewan Power Corpn., Regina, for their Unity Power Plant. B.o.T. (Ref. CRE 12205/52)*.

April 29.—Portuguese E. Africa. Supply of sundry electrical equipment (including four turbo-generators for locos) required for Ports, Railways and Transport Dept., Lourenco Marques. B.o.T. (Ref.: CRE 10937/52)*.

April 30.—New Zealand. Supply of 3 miles of cable, v.i.r., lead or lead-alloy covered (not polythene-sheathed). Must be packed on wooden drums each containing 440 yd. For Director-General (Stores Division), G.P.O., Wellington C.I. Mark envelopes "Quotations for P. and T. 150/5301."

May 1.—S. Africa. Post Office invites tenders for supply of three radio telephony/telegraphy short-wave single-handed transmitters for the Olifantofontein radio station. Chairman, Union Tender Board and Supplies Office, 271 Visagie St., Pretoria. Ref. No. 1424.

May 5.—Uruguay. Supply of 99,950 metres of lead-covered conductors, and 41.5 metres of plastic-covered conductors for use with service tension of 220V. Gerencia Administrative de la U.T.E., Paraguay 2431, Montevideo. B.o.T. (Ref. CRE 11132/52).*

May 12.—Greece. Ministry of Communications requires supply of junction telephone cable with loading and terminating equipment, and switching equipment and associated installation material for automatic central offices. B.o.T. (Ref. CRE 11274/52)*.

May 15.—Pakistan. Director General of Supply and Development, Karachi, has issued call for tenders for supply of pumping plants (centrifugal, submersible and deep-well turbine pumps), diesel generating sets and trailer pumps. B.o.T. (Ref. CRE 10653/52).*

July 15.—New Zealand. Supply of 250 suspension insulator assemblies, 325 strain insulator assemblies and 115 jumper insulator assemblies for Islington-Addington 66kV line; 800 suspension and 80 strain insulator assemblies for Stratford-New Plymouth 110 kV line. State Hydro Electric Dept., Wellington. B.o.T. (Ref. CRE 11325/52 and 11540/52).*

July 22.—New Zealand. Supply of 250 MVA 11 kV switchgear of duplicate busbar, indoor, metalclad, draw-out type and accessories for Bombay substation, Auckland. State Hydro-Electric Dept., Wellington. Documents available at N.Z. Govt. Offices in London.

Aug. 12.—New Zealand. State H.-E. Dept. invites tenders for manufacture and supply of 572 220 kV galvanised steel transmission towers for Roxburgh-Wainate section of Roxburgh-Islington line. Specifications available from N.Z. Govt. offices in London.

CONTRACTS PLACED

Doddington. Electrical work at County Hospital for E. Anglian Hospital Board, Ely Electrical Co., £1,320.

Doncaster T.C. Electrical installation in 54 houses on Cantley estate, Francis Sinclair, Ltd., £1,576.

London. Electrical installation at Broadwater and Galton schools, C. S. Tagg Ltd.; same at Campbell and New End schools, John Trapp (Electrical) Ltd.

Newcastle-on-Tyne. Electrical works at Rutherford College of Technology, Robson and Coleman, Ltd., £6,950. Installation of internal mains at Garlands Hospital, B.I.C.C. Ltd., £2,003; and electric lighting at same, Reid, Ferens and Co., £1,116.

Penrith (Cumb.) U.D.C. Street lighting on Scaws estate, N.W. Electricity Board, £1,171.

Smethwick T.C. Supply of electrical equipment, Felix Bateman, Ltd., £4,026.

Stockport T.C. Electrical installation in 98 houses and flats at Binningham., Marlow Electrical Co., £4,211.

Stoke-on-Trent. Electrical installation at "Westcliffe," F. W. Harris and Co., £14,530.

Your Queries — Answered

"Eltex" chicken rearing equipment, makers of? T.E.—George H. Elt, Ltd., Eltex Works, Bromyard Rd., Worcester. (22627)

Mole type ploughs for cable laying, suppliers of? A.W.—Clough Smith and Co., Ltd., 140 Station Rd., Redhill. Ransomes Sims and Jefferies, Ltd., 69 Old Broad St., E.C.2. (22631)

"Speedmatic" hi-speed routers, agents for? DeM.—Gaston E. Marbaix, Ltd., Devonshire House, Vicarage Crescent, S.W.11. (22643)

C.C.A. Vacs Ltd., address of? C.W.—This firm is now C.C.A. (Vacuum Cleaners), Ltd., 109 South St., Ponders End, Enfield. (22648)

"Hotric" water heaters, address for spares? T.B.—Geo. Pearson (Engrs.), Ltd., 208 Chingford Mount Rd., London E.4. (22654)

Nursery lampshades which rotate, makers of? C.S.—Waite and Son, Ltd., Menin Works, Bond Rd., Mitcham, Surrey. (22661)

"R.V.C." vacuum cleaners, makers of? S.W.—These were made by Radio Vacuum Cleaners, Ltd., a firm which went out of business many years ago. Try Gem and Radio Service Co., 233 Cricklewood Broadway, N.W.2, regarding repairs. (22667)

The above are selected from questions we have answered this week. If you have a query, send it to us.

Towcester R.D.C. Supply and erection of 28 fluorescent lighting units in town's streets, N. Midland Engineering Co. Ltd., £2,252.

Wallasey T.C. Electrical installation at Mount Rd. infants' and Park county infants' schools, Merseyside and N. Wales Electricity Board.

Wrexham T.C. Electrical installation in 110 dwellings, Arthur Hughes, £2,678.

York. Electrical installation in 220 houses in Moor Lane, £6,306, and same in 200 houses on Askham Lane estate, £5,767, R. T. Checksfield.

TRADE NOTES

New factory. A large factory, of 90,000 sq ft, at Carfin Industrial Estate, Lanarkshire, has been allocated by the Board of Trade to Standard Telephones & Cables Ltd.

Showroom. A.B.C.D. Plastics, Ltd., have opened a showroom at their works at 32 York Way, King's Cross, N.1, where their range of Moonglow chandeliers, floor standards, shade and table lamps are on view.

Holidays. Telcon Works, Greenwich, and Frequency Works, Farnborough, Kent, of the Telegraph Construction and Maintenance Co., Ltd., will be closed for the annual holiday from 5 p.m., July 18, until 8 a.m., August 5.

Wolfram. To facilitate administrative arrangements for the purchase, supply and distribution of wolfram, Messrs. Metal Traders, Derby and Co., and H. A. Watson and Co., at the instigation of the Ministry of Materials, have together formed a new company under the name of British Tungsten. At present the three parent concerns handle the Ministry's business, but when British Tungsten is fully operative, it will, in effect, become the Ministry's sole agent. It is understood, however, that purchasers will continue to deal through the three parent undertakings.

Factory. Metropolitan-Vickers Electrical Co., Ltd., are to take over a large part of the Germiston factory in the Springburn district of Glasgow. It is to be used for the manufacture of condensers and ancillary plants for power stations, it is stated.

E.W.F. E. Dawson (Branches), Ltd., 10 Gray's Inn Road, W.C.1, has been elected a member of the Electrical Wholesalers Federation.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Monday night)

	£ s. d.	New York price
COPPER, electrolytic	231 0 0	£220 0 0
LEAD, good soft pig (foreign)	163 0 0	152 0 0
,, ,, ,, "English" quality ...	164 10 0	
TIN (99-99.75%) ... ... (Cash)	959½-960½	—
,, (3 months)	962-963	—
ALUMINIUM, commercial purity (del.)	154 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.) ...	59 10 0	—
Mild Steel Tape (0.04 in.) ...	39 15 0	—

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Brush in design. 674,910. Class 12. Battery driven electric vehicles. Brush Electrical Eng. Co., Ltd., Falcon Works, Nottingham Rd., Loughborough, Leics.

Cascap. 702,793. Class 9. Capacitors and transducers all being electrical apparatus made wholly or principally from ceramics. Plessey Co., Ltd., 56 Vicarage Lane, Ilford, Essex.

Comyn, B698,419 Class 7. Machines for separating oil and water. Alexr. Esplen & Co., Ltd., 14, Dale Street, Liverpool 2.

Enfo. 699,684. Class 9. Electric accumulators, ammeters, batteries, ignition coils, commutators, condensers, connectors, etc. Ford Motor Co., Ltd., 88 Regent St., W.1.

Kermelectrix, 703,281 Class 9 and 703.282 Class 10. Electrical instruments and apparatus, etc. 703,283 Class 11. Electric installations for lighting, heating, steam generating, cooking, refrigerating, etc. Kermatex Eng. Ltd., Martins Bank Chambers, Burnley Rd., Padiham, Lancs.

Thermodare, 704,458 Class 11. Thermal storage heaters for space heating. Aberdare Electric Co. Ltd., Aberdare Works, Finglas, Co. Dublin.

Vitromic. 704,406. Class 9. Electric instruments and apparatus. A. L. G. Cianchi, 13 Abel Close, Adeyfield, Hemel Hempstead, Bucks.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Voluntary Liquidation

C. Linnell and Sons Ltd., electrical contractors of Stoke-on-Trent and Wolstanton. At statutory meeting of creditors, statement of affairs showed liabilities amounting to £3,104 against net assets of £2,958, leaving deficiency as regarded creditors of £146. Issued share capital amounted to £1,500, and, so far as shareholders were concerned, there was total deficiency of £1,646. During discussion it was stated that claims of £660 in respect of directors' fees would be waived until all creditors received 20s. in the £. Resolution passed confirming voluntary liquidation with P. J. Snow, Bourner Bullock and Co., C. A. Hanley, as liquidator, with committee of inspection.

Gordon and Luker, electrical engineers, of Lewes. Partnership between James W. Luker, Michael H. Billett, and Henry A. R. Phillips dissolved as from Mar. 28. Debts received and paid by J. W. Luker and H. A. R. Phillips, who will continue to operate the business as before.

Fordham Electrical Engineering Co., Ltd. First and final dividends of 4s. 2.437d. in £ payable at Official Receiver and Liquidator's office, Inveresk House, Strand, W.C.2, on any day (except Sat.) after April 1.

West End Radio, radio and electrical engineers and dealers of Keynsham, Som. Partnership between Charles A. V. Bates and Hubert J. Gill dissolved as from Mar. 15. Business to be continued by H. J. Gill, who will receive and pay all debts.

S. C. H. Thorn, radio and electrical engineers, of Esher and Chessington (Surrey). Partnership between Stanley C. H. Thorn and George C. Howes has been dissolved as from March 31.

BANKRUPTCY ACTS

Intended Dividends

Shrewsbury. Frederick A. Walmsley, electrical contractor, trading at 48 Wyle Cop. Last day for receiving proofs, April 17. Trustee is F. C. Ormrod, Official Receiver, 12 Lonsdale St., Stoke-on-Trent.

BUSINESS PROSPECTS

HOME

Aberdeenshire. One hundred and seventy houses to be built at Bridge of Don.

Andover T.C. Erection of 24 houses on Mead Hedges site. R. S. Offord, Borough Surveyor, "Beech Hurst," Weyhill Rd.

Banbury T.C. Construction of 40 flats and 20 houses on Neithrop site. Borough Surveyor, Municipal Bldgs., Marlborough Rd.

Barnack (Northants) R.D.C. Primary school to be built in district to plans by Ruddle and Wilkinson, Long Causeway Chambers, Peterborough.

Beccles T.C. It has been recommended to approve plans for 169 dwellings and to invite tenders for erection of 16 houses on Barnham Rd. site.

Beddington and Wallington T.C. Erection of 24 houses in Richmond Rd., and 18 flats in Beddington Corner re-development scheme. Borough Engineer, Town Hall, Wallington.

Belfast. The Ardoyne tramcar depot is to be converted to accommodate trolley- and omnibuses at estimated cost of £118,000.

Billinge and Winstanley (Lancs) U.D.C. Construction of 28 houses on Claremont site. Names to W. Hill, clerk, Council Offices, Main St., Wigan.

Bootle T.C. Construction of 44 dwellings on Sterrix Lane site. Borough Surveyor, Town Hall.

Bridgwater T.C. Erection of 24 houses at Parkway. Borough Engineer, Town Hall.

Cannock (Staffs) U.D.C. Erection of 34 houses at Hednesford. S. Harrison, architect, Council House, The Green.

Chelmsford T.C. Erection of 46 bungalows on various sites. Borough Engineer, Surveyor and Architect, Municipal Offices, Duke St.

Chorley T.C. Thirty houses to be built on Tootell St. site and a further 30 near Weldbank Lane.

Dover T.C. Plans approved for erection of 32 flats at Durham Hill.

Dublin. Construction of 60 houses on Newtownpark site. Engineer, 5 Parnell Sq.

Ealing T.C. It is proposed to build 160 dwellings on Northolt Park estate.

Guildford T.C. Negotiations expected with W. H. Gaze and Sons, Ltd., for construction of 82 houses at Bushy Hill.

Hemsworth U.D.C. Erection of 44 houses and six bungalows on Moorshutt and Kingsley estates. Apply to C. Earnshaw, Clerk of Council, Council Offices, White Hall.

Hungerford (Berks) R.D.C. Erection of 22 houses on two sites. F. H. Obrey, surveyor, Council Offices, 128 High St.

Leamington Spa T.C. Application will probably be made to borrow £3,270 for installation of electricity in houses on Shrubland estate.

Loddon (Nor.) R.D.C. Thirty-six houses are to be erected in district as well as 15 at Chedgrave, 14 at Brooke and 6 at Therlton.

London. R. Ward and Partners, 17 Lowndes St., S.W.1, are architects for erection of N.F.U. headquarters in Knightsbridge.

Lynton (Devon) U.D.C. Construction of 20 houses on Graltons site. L. Ridge, Clerk of Council, Town Hall.

Newcastle-on-Tyne. Tenders likely to be invited shortly for erection of £250,000 pathological institute and blood transfusion centre at General Hospital. Approval received for erection of 120 flats in Hindhaugh St. area.

Ongar (Essex) R.D.C. Construction of 42 houses on Shelley estate. Engineer and Surveyor, Bowes Field, High St., Chipping Ongar.

Ormskirk U.D.C. Erection of 24 houses on Richmond Ave. estate, Burscough. Surveyor, Council Offices, Burscough St.

Peterborough. Trades school for training of engineers to be built.

Scunthorpe T.C. Eighty-two houses to be built on New Brumby estate; six shops on Grange Lane estate, and 60 gardens on Lincoln Gardens estate. Borough Architect, Town Hall.

Peterlee. A £32,000 health centre has been proposed. County Architect is G. R. Clayton, Court Lane, Durham.

Poulton-le-Fylde (Lancs) U.D.C. Application to be made for sanction to borrow £113,780 for erection of 84 houses on Carr Head estate.

Radcliffe T.C. Application to be made for sanction to borrow £59,800 for erection of 48 houses in Wordsworth Ave.

Rochdale T.C. Erection of nine blocks of flats (totalling 36) on Ivor St. estate. W. H. G. Mercer, Borough Surveyor, Town Hall.

Sittingbourne (Kent) U.D.C. Erection of 84 dwellings to complete Homewood estate. Engineer and Surveyor, High St.

Spenborough (Yorks) U.D.C. Scheme approved for 88 houses on Garden House site, Littletown. Ministry approval sought.

Stroud (Glos.) U.D.C. Erection of 30 houses at Cashes Green. F. F. Langley, engineer and surveyor, Council Chambers, High St.

Waterford. Erection of 48 houses at Crobally Upper, Tramore. Whelan and Co., quantity surveyors, 108 The Quay, Waterford.

Watford T.C. Erection of 22 houses on Kytes estate. F. C. Sage, Borough Engineer, Town Hall.

OVERSEAS

Canada. Details of domestic food mixing machines made by U.K. firms wanted by Donald C. Keddy Ltd., 53 Upper Water St., Halifax, N.S. Competitive price should be about $36. The Canadian company would act as wholesale distributors.

Cuba. Ministry of Communications is to acquire, in countries of origin without tender, lifts, air conditioning equipment, lamps, etc., for new G.P.O. to be built in Havana. Total amount to be spent is $500,000. Offers to Negociado de Sellos y Material, Ministerio de Comunicades, Havana.

India. Electro Mechanical Industries, Mania Shah's St., Khadia, Ahmedabad, are interested in obtaining supplies of electrical accessories, such as porcelain fuse units, conduit pipes, etc.

U.S.A. Electric motors, fans, rigid conduit, condulets, boxes, switches, control panels, copper wire and cable, incandescent and fluorescent lighting fittings, lifts, required for building work by Driscoll Co. George F. Driscoll Co. Inc., 41 East 42nd St., New York 17, would like to contact U.K. suppliers.

Also International Export Co., 431 Carondelet St., New Orleans, Louisiana, wishes to receive quotations for all sizes of electrically operated mechanical refrigeration units for 220 V 50 c/s supply. Contact Mr. Jose M. Ortiz at above address.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Cool-Rite, Ltd., Glen Fern Chmbrs., Glen Fern Gdns., Bournemouth. Manufacturers of and dealers in machinery and accessories, air conditioning and cooling plants, etc. Cap.: £4,000. Dirs.: T. R. Jenkins and H. A. C. Luckham.

G. Cummings Electrical Ltd., 135 Green Lane, Ilford, Essex. Electrical engineers and contractors, etc. Cap.: £1,000. Dirs.: G. J. E. Cummings and C. G. Bentall.

De-Birding Ltd., 115-117 Colmore Row, Birmingham 3. Mechanical, electrical, electronic, magnetic, plastic, radio, and general engineers, etc. Cap.: £3,000. Dirs.: R. S. Drake, H. G. Ward, H. J. Macnamara, H. A. Roemmele and W. Elliot.

G. W. Franklin and Son Ltd., 29 Fitzroy Sq., W.1. To take over business of "G. W. Franklin and Son," electrical engineers and contractors, electrical consultants, etc. Cap.: £15,000. Dirs.: G. W. Franklin and Maude Franklin, L. G. Franklin and Violet M. Franklin.

D.G. Electrical Co. Ltd., 317 High Holborn, W.C.1. Manufacturers of and dealers in dynamos, armatures, magnetos, batteries, etc. Cap.: £100. R. N. Emery signs as director.

J. A. Pierce (St. Asaph), Ltd., Glebe Stores, Denbigh Rd., St. Asaph. Gas engineers and electricians, etc. Cap.: £2,000. Dirs.: J. A. Pierce (managing director), Muriel Pierce and E. Pierce, and E. D. Card.

G.S.L. Products Ltd., 48 Uxbridge Rd., Ealing, W.5. Designers, patentees and manufacturers in electrical apparatus, etc. Cap.: £1,000. Dirs.: P. Gibson and G. S. Lisle.

Hartley Recorders Ltd., 1a Harrington Rd., S.W.7. Manufacturers of and dealers in electronic and mechanical machines, instruments, etc. Cap.: £100. Dirs.: A. W. M. Hartley and R. G. Cooke.

F. G. Ride and Co. Ltd., 72 Gartside St., Manchester 3. Manufacturers of and dealers in artificial lighting apparatus, electrical plant, etc. Cap.: £5,000. Dir.: H. Fisher.

Ronning and Co. Ltd., 7 York Pl., Adelphi, W.C.2. Electricians, mechanical engineers and manufacturers, etc. Cap.: £1,000. Dirs.: Daisy E. B. Rasmussen, Gregor B. Rasmussen, A. Skuterud, K. Englelund and R. Ronning.

R.W.S. (Developments) Ltd., 84 Colmore Row, Birmingham 3. To acquire the benefit of British Patent No. 666,037, and all rights in respect thereof, and all data, machines, models and other apparatus relating thereto, and to carry on business of manufacturers of the magnets (the subject matter of the said invention), etc. Cap. £5,000. T. F. Walker signs as director.

Springwood Engineering Co. Ltd., Hirsts Yard, Spring St., Huddersfield. Aeronautical, motor, mechanical, electrical and general engineers. Cap.: £2,000. Dirs.: not named. Subs.: Margaret Goff and Nora Bentley.

Transductors Ltd., 79 Eccleston Sq., S.W.1. Manufacturers and repairers of electrical and other apparatus, etc. Nom. cap.: £100. Dir.: Dr. R. Willheim.

Vacuum Electrical Products Ltd., 1-7 Corporation St., Birmingham. Cap.: £2,000. Dirs.: G. K. Newman and C. J. Norris.

Valradio (Scotland) Ltd., New Chapel Rd., High St., Feltham, Middx. Dealers in and distributors of electrical apparatus, etc. Cap.: £300. Dirs.: J. Valchera, W. Reid Walker and R. J. Walker.

Wedon (Engineers) Ltd. Mechanical and electrical engineers, etc. Nom. cap.: £1,000. Dirs.: W. A. Ashley, W. H. Church, L. W. Clarke, O. C. Nye, and R. G. Sharpe, addresses not stated. Subs.: F. M. Williams, 12 High St., Stevenage, Herts. (solr.) and F. W. T. Skinner.

MEETINGS TO NOTE

THURSDAY, APRIL 10

INCORP. PLANT ENGRS. (Newcastle-on-Tyne).—"Applications of Hydraulics." D. V. Rowles. Roadway House, Oxford St., 7.30 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section).—"X-ray Equipment and the Control Gear." C. S. Norton. Metrovick. Watling St., Motherwell, 7 p.m.

I.E.E. (N.E. Scotland sub-centre).—Annual meeting at Royal Hotel, Dundee, 7 p.m.

E.P.E.A. (Mersey Tech. Group).—"Protection of Power Transformers." H. T. Sheppard. Elect. Showrooms, Whitechapel, Liverpool, 7 p.m.

TUESDAY, APRIL 15

INCORP. PLANT ENGRS. (Glasgow).—"Development of new Mechanical Engineering Research Laboratory at E. Kilbride." T. C. Crowhall. 351 Sauchiehall St., 7 p.m.

INST. OF HEATING AND VENTILATING ENGRS. (Liverpool Branch).—"Embedded Panel Warming—Practical Applications." H. H. Bruce. Radiant House, Bold St., 6.30 p.m.

WEDNESDAY, APRIL 16

A.S.E.E. (Manchester Branch). Open discussion and 15-min. lecturettes at Engineers' Club, Albert Sq., 7.30 p.m.

INCORP. PLANT ENGRS. (Western Branch).—"Industrial Fire Protection." C. Gotsell. Grand Hotel, Bristol, 7.15 p.m.

BRITISH INSTN. OF RADIO ENGRS. (London).—"Current Radio Interference Problems." E. M. Lee. School of Hygiene, Keppel St., W.C.1, 6.30 p.m.

I.E.E. (Southern Centre).—"Computing Machines." J. Bell. Technical College, Weymouth, 6.30 p.m.

THURSDAY, APRIL 17

BRITISH INSTN. OF RADIO ENGRS. (S. Midlands Section).—"Acoustics and the Radio Engineer." E. G. Richardson. Public Library, Rugby, 7.15 p.m.

A.S.E.E. (Kent Branch). "Electrical Precautions in Operating Theatres." A. A. Mansell. County Hotel, Canterbury, 8 p.m.

I.E.E. (London Utilisation Section).—"Equipment of Battery-Electric Vehicles," W. D. Sheers; "Economic Basis of Battery-Electric Road-Vehicle Operation and Manufacture," H. W. Heyman. Savoy Place, W.C.2, 5.30 p.m.

I.E.E. (S.W. Sub-centre).—"Modern Developments in Electric Welding." H. G. Taylor. Grand Hotel, Plymouth, 3 p.m.

FRIDAY, APRIL 18

INSTN. OF MECHANICAL ENGRS.—"Aspects of the Mechanics of the Caviation Process." Prof. R. T. Knapp. Storey's Gate, S.W.1, 5.30 p.m.

I.E.S. (Birmingham Centre).—"Light from Space." W. Wilson. Imperial Hotel, Temple St., 6 p.m.

I.E.E. (N. Staffs. Sub-centre).—Annual meeting. Discussion on "Should Measures to Limit Peak Demand be Introduced into Households by Electricity Authority?" Elect. Showrooms, Stoke, 7 p.m.

A.S.E.E. (Crewe Branch).—"Motor Fault Locating and Rewinds." D. Bosworth. Copeland Arms Hotel, Glebe St., 7.30 p.m. (postponed from April 11)

ASSOCIATED ELECTRICAL INDUSTRIES

Record Orders

THE fifty-second annual general meeting of Associated Electrical Industries, Limited, was held on April 1 in London.

Sir George E. Bailey, C.B.E., M.Sc., M.I.Mech.E., M.I.E.E. (the chairman) said that the net profit for the year at £2,524,000 was slightly higher than that for the previous year. The dividend of 20% recommended might appear to be a generous return, but it should be understood that stockholders had invested large sums in the business by way of retention of profits. The return was, in fact a very modest one, being slightly less than 4¼% on the total cash invested. The very conservative dividend policy adopted by the Board was due to the calls made on the company's financial resources by the heavy burden of taxation, the high cost of replacements, the increase in the value of work-in-progress and the necessity of providing the extensions required to meet the ever-expanding demand for their products.

Burden of Taxation

How great was the burden of taxation was evidenced from the fact that during the year the company had had to provide £5,400,000 for taxation. Against that the Ordinary stockholders would receive £673,000 net for the year. As to the effect of the Budget on the profits for 1952, it was estimated that if the profits were the same as in 1951 the levy would amount to around £350,000. To that extent, therefore, there would be less available for ploughing back.

The Group companies continued to secure a large volume of orders for export, up to their maximum manufacturing capacity. This year's order book showed a wide distribution of business throughout the world covering all products.

However, to fulfil their heavy obligations still greater efforts were needed. With the value of orders in hand standing at the record figure of £135,000,000 he hoped their employees would realise that given the raw materials, they need have no anxiety with regard to employment and would re-double their efforts to reduce that load, particularly as the Budget proposals would mean less taxation on enhanced earnings. The combined efforts of management and workpeople, however, would be unavailing if the necessary raw materials were not forthcoming.

The demand for electricity continued to expand throughout the world and with it the demand for their products. The total value of orders received in 1951 was 30% higher than in 1950. The consumption of electricity per head of population in Great Britain was, however, still only about half the comparable figure in the United States.

In the past the tendency had been for the consumption of electricity in this country to be doubled over 10/12 years. That rate of expansion at least would continue for some time to come. That meant that if the Group was to maintain its premier position they must continue to expand their manufacturing facilities.

The report was adopted.

TELEGRAPH CONSTRUCTION AND MAINTENANCE

Larger Production and Profits

THE eighty-eighth annual general meeting of the Telegraph Construction and Maintenance Company, Ltd., was held on April 8 in London, the Rt. Hon. Lord Colgrain, the chairman, presiding.

The following is an extract from his circulated statement:

It is very satisfactory to be able to submit once again excellent results for the past year. Despite the difficulties connected with the supply of raw materials, the company produced a greater volume of goods and also increased the trading profits by about 70%. This was achieved with substantially the same number of employees, so that the increase was by no means due merely to the change in the value of money. It can therefore be said that your company has succeeded in carrying out the Government's policy of greater productivity. The progress and successful trading of our subsidiaries and associated companies have continued to be most encouraging. Every department and subsidiary has had a profitable year, hindered only by material shortages.

Our associated company, Submarine Cables, Ltd., whose manufacturing activities are intimately mixed with our own at Greenwich, continues to thrive, and but for material shortages should have had a record year. The year was, nevertheless, satisfactory and the company made an appropriate contribution to our profits. With a more satisfactory system of control in 1952 of the all-essential commodity steel, which has been promised, and in view of the strategic importance of submarine cable to defence and the intercommunications of the Commonwealth, I am hopeful for good results in the current year. The demand for submarine cable as evidenced by the order book is highly satisfactory.

Devastating Taxation

This really completes the summary of the work and results of the company during 1951, and all that remains is for me to say how completely I am in agreement with the speeches and statements recently published as to the devastating effect of ever-increasing taxation on British industry leading to the destruction of initiative.

Simple figures by comparison with 1939 values may lead to the conclusion that profits are adequate to meet present-day taxation, to put ample to reserve and to pay fair dividends. This is not the case. The purchasing power of the pound has fallen so low that the present cost of plant replacement is two or three times the present amount provided by depreciation, and this merely maintains output at the old level and at 1939 efficiency. Today, however, it is clear that the British workman's productivity is low largely because he is under-mechanised, like a car of insufficient horse power. Moreover, it is not sufficient that British industry should merely maintain its production capacity; it must expand and expand rapidly, if these islands are to sustain and feed an ever-growing population and provide it with even the present standard of living.

The report and accounts were adopted.

...WHICHEVER YOU PREFER

HENLEY LEAD SERVICE BOXES are pressed from extruded lead sheet. The two halves of the box have specially designed flanges. These form a joint that can be easily wiped, with the minimum amount of plumber's metal, and provide an effective seal. Ample space for jointing. Available in various sizes to take normal main and service cables.

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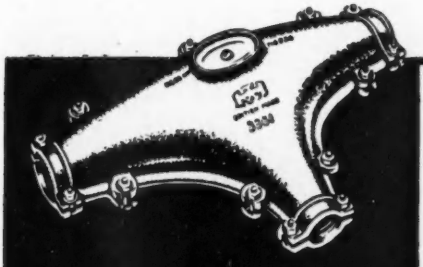

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

COUNTY BOROUGH OF SWANSEA

West Penlan Primary School, Swansea

TENDERS FOR ELECTRICAL INSTALLATION

FIRMS wishing to tender for the electrical installation at the West Penlan Primary School, now in course of erection at Penlan, Swansea, are invited to submit their applications to the Borough Architect, The Guildhall, Swansea, on or before Saturday, April 19, 1952.

Plans, specifications and conditions of contract can be obtained on application and deposit of £2 provided the applicant gives satisfactory evidence of having previously carried out work of a similar character. The deposit will be refunded after delivery of a bona fide tender (which is not subsequently withdrawn) and the return of all documents.

No guarantee is given that the lowest or any other tender will be accepted.

T. B. BOWEN,
Town Clerk.

The Guildhall,
Swansea.
March 29, 1952. (S 51)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

SUPERVISOR, PUNCHED CARD SECTION

Portsmouth Sub-Area Office, Accountant's Department. Salary: N.J.C. Grade 6 (£680-£755 per annum). N.J.C. Conditions of Service.

The person appointed will be required to organise and supervise the staffing and the operation of a large punched card installation dealing with electricity billing and expenditure. Extensive practical accountancy experience will be an advantage to an applicant.

SENIOR FEMALE SUPERVISOR, PUNCHED CARD SECTION

Portsmouth Sub-Area Office, Accountant's Department. Salary N.J.C. Grade 2 (£440-£500 per annum). N.J.C. Conditions of Service.

The person appointed will be responsible to the section supervisor for the discipline and work of the machine operators. Applicants must be competent punched card machine operators and have had experience of the supervision of staff.

The successful candidates will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

Applications, on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, to be returned to him in envelopes suitably endorsed, not later than April 21, 1952.

F. W. KEMPTON,
Secretary.

April 10, 1952. (S 63)

LONDON ELECTRICITY BOARD

SENIOR DEVELOPMENT ASSISTANT

APPLICATIONS are invited for the above position at Hampstead, N.W.3.

Applicants are required to have a sound knowledge of all aspects of service to consumers, and be capable of planning and estimating for domestic, commercial and small industrial installations. They should possess a good knowledge of electrical apparatus and the basic principles of tariffs and their application. Preference will be given to applicants possessing the Ordinary National Certificate in Electrical Engineering and the E.D.A. Salesmanship Certificate.

The post is graded within the National Joint Council Agreement (Administrative and Clerical Grades) as Grade 2, i.e., £440—£500 per annum, plus the appropriate London Allowance.

Applications, stating age and full details of qualifications and experence, to be sent through the Edgware Road Employment Exchange, 211 Marylebone Road, London, N.W.1, quoting ref: 2993 (L.E.B.), to be received by April 16, 1952. (S 62)

LONDON ELECTRICITY BOARD

ENGINEER (OPERATION AND MAINTENANCE)

APPLICATIONS are invited for the above position in the Finsbury/Shoreditch District of the Northern Sub-Area.

Applicants should have had a sound technical education up to at least National Certificate standard, with practical experience,in general mains work, both A.C. and D.C., including installation and maintenance of distribution systems, also the preparation and keeping of associated records.

The post is graded under Schedule "A" of the National Joint Board Agreement as Class "E," Grade 11, £529 4s. per annum rising to £547 1s. per annum, inclusive of London Allowance.

Application forms obtainable from the Establishments Officer, 46 New Broad St., E.C.2, to be returned duly completed by April 26, 1952. Please enclose addressed foolscap envelope and quote ref: V/1435/T on all correspondence. (S 61)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for JUNIOR ENGINEERS in Generating Stations in the Division.

Salary N.J.B. £375-£496, the point of entry depending on qualifications, experience, and the size of the station to which appointed.

With the continuing expansion of the industry and the installation of additional generating plant the chances of promotion for suitable candidates are considered to be good.

Applicants should have had a sound general education and an apprenticeship or practical training suitable to the industry. Preference will be given to graduate members of a recognised professional institution or those possessing a University Degree or Higher National Certificate.

The duties of those appointed will vary with each station, but will include as a general rule the operation and control, under supervision, of generating plant. Vacancies also exist for those who wish to specialise in the maintenance of instruments and other electrical and mechanical generating plant. Applicants should be prepared to accept shift duties if called upon to do so.

The appointments are superannuable and subject to a satisfactory medical examination.

Forms of application may be obtained from P. D. A. Oliver, Divisional Secretary, 111 High Street, Portsmouth, and must be returned by April 25, 1952. (S 78)

AUSTRALIA

Snowy Mountains Hydro-Electric Authority

APPLICATIONS are invited for the following positions in the Mechanical Engineering Division:—

EXECUTIVE ENGINEERS—MECHANICAL

Grade III	£A.1988/2296
Grade II	£A.1678/1926
Grade I	£A.1370/1678

MECHANICAL ENGINEERS

Grade IV	£A.1280/1370
Grade III	£A.1106/1190
Grade II	£A.1034/1082

The above salaries include current cost of living adjustments and are subject to future variations applicable to the Commonwealth Service. Commencing salary in particular grade will be determined by qualifications and experience. Conditions of employment include three weeks' annual leave and sick leave.

Applicants for engineering positions must be graduates in mechanical engineering of a recognised University, be corporate members of the Institution of Engineers, of the Institution of Mechanical Engineers (London), or hold equivalent professional qualifications.

The successful applicants will be engaged on duties in connection with the preparation of designs, specifications, cost estimates, contract supervision and detail work for (a) hydraulic turbines, valves and associated equipment, (b) hydraulic gate valves, control equipment, screens, etc., and (c) cranes, winches, mechanical handling equipment, etc.

Subject to certain conditions the fares of successful applicants and their families will be paid by the Authority.

In the first instance applicants should write stating age, nationality, marital status, present position and salary and give full and complete particulars of qualifications and experience. Applications should be addressed to the Engineer-in-Charge, S.M.H.E.A., 18 St. George Street, Hanover Square, London W.1. The Authority does not undertake to answer all communications. Correspondence will be entered into only with those people required for interview. (S 64)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for positions as DRAUGHTSMEN or SENIOR DRAUGHTSMEN in (a) the Mechanical Engineering Section and (b) the Civil Engineering Section, of the Chief Generation Engineer's (Construction) Department at Wolverhampton. N.J.B. Service Conditions, superannuable appointments, salaries in accordance with Schedule "D": Senior Draughtsmen, Grade 5, £547 to £651, and Engineering Draughtsmen, Grade 6, £413 to £547.

Applicants for (a) should have experience in the layout and design of generating stations, or generating plant, including boilers, turbo-alternators, and ancillary equipment, and for (b) experience in the layout and design of heavy structural steelwork, or of civil engineering and building works for generating stations, including reinforced concrete work.

Forms of application available from Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned completed by April 26, 1952.

F. W. LAWTON,
Divisional Controller.
(S 65)

NORTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF SECOND ASSISTANT ENGINEER

No. 3 Sub-Area Testing Section, Stalybridge

CANDIDATES should have had extensive experience of large scale repairing and testing of all types of metering equipment, including high voltage and summation equipments and D.C. metering, the calibration and testing of indicating and recording instruments and relays, the preparation of metering schemes for large industrial consumers, and have a thorough knowledge of the requirements of the Electricity Supply (Meters) Act.

Ability to organise and control staff is essential. Experience in experimental and development work will be an advantage. Applicants should preferably be corporate members of the I.E.E.

Salary scale: £844/881 p.a. Class "K," Grade 7, N.J.B. Conditions.

Applications to Sub-Area Manager, No. 3 Sub-Area Headquarters, The North Western Electricity Board, Union Street, Oldham, by April 21, 1952. (S 59)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

JUNIOR CHEMISTS based at either Croydon or Brighton. Applicants should have Matriculated and be studying for Inter B.Sc. degree or Higher National Certificate. Commencing salary £375 p.a. plus £25 p.a. London allowance if based at Croydon. Apply through the Employment Exchange on forms obtainable from Divisional Secretary, B.E.A. S.E. Division, Lower Ham Road, Kingston-upon-Thames, by May 5, 1952. S 79)

LONDON ELECTRICITY BOARD

ENGINEERS (OPERATION AND MAINTENANCE)

APPLICATIONS are invited for the above positions in the North Eastern Sub-Area.

Applicants should have received sound general and technical education up to Higher National Certificate, or equivalent standard, and completion of an engineering apprenticeship with a manufacturer or experience in the Electricity Supply Industry will be considered an advantage.

The posts are graded under Schedule "A" of the National Joint Board agreement as follows:—

West Ham and East Ham/Barking Districts—Class "F," Grade 13—£471 to £490 per annum, inclusive of London Allowance.

Leyton District—Class "E," Grade 13—£452 to £465 per annum, inclusive of London Allowance.

Application forms obtainable from Establishments Officer, 46, New Broad St., E.C.2, to be returned completed by April 26, 1952. Please enclose addressed foolscap envelope and quote ref: V/1434/T. on all correspondence. (S 60)

BRITISH ELECTRICITY AUTHORITY

South Western Division

ASSISTANT SHIFT CHARGE ENGINEER required at Plymouth "A" Generating Station.

Superannuation Scheme. Salary, N.J.B. Class "F," Grade 9, £587-£606.

Applicants should have good technical qualifications and a sound knowledge of the operation and maintenance of Generating Plant.

Apply by April 17, 1952, stating age, qualifications, experience, present appointment and salary to R. C. Barrett, Divisional Secretary, 26 Oakfield Road, Bristol, 8.

April 3, 1952. (S 80)

BRITISH ELECTRICITY AUTHORITY

South Western Division

ASSISTANT MAINTENANCE ENGINEER (Mechanical) required at Plymouth "B" Generating Station.

Superannuation scheme. Salary, N.J.B. Class "G," Grade 8, £658 to £683.

Thorough mechanical training, preferably in manufacturer's works, and experience in turbine and p.f. boiler plant maintenance essential.

H.N. Certificate or equivalent qualification desirable.

Apply by April 25, 1952, stating age, qualifications, experience, present appointment and salary, to R. C. Barrett, Divisional Secretary, 26 Oakfield Road, Bristol 8.

April 4, 1952. (S 99)

BRITISH ELECTRICITY AUTHORITY

South Western Division

STATION SHIFT CONTROL ENGINEER required at Feeder Road Generating Station.

Superannuation scheme. Salary, N.J.B. Class "E," Grade 10, £535 to £549.

Training and experience in control and operation of steam generating plant and main switchgear essential. Good technical qualifications desirable.

Apply by April 25, 1952, stating age, qualifications, experience, present appointment and salary, to R. C. Barrett, Divisional Secretary, 26 Oakfield Road, Bristol 8.

April 4, 1952. (S 88)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following superannuable position. Salary and conditions of service will be in accordance with the National Joint Board Agreement:—

JUNIOR ENGINEER
Rye House Generating Station.

The duties of the successful applicant will include assisting in the control room on shift and other operational and investigational duties. Preference will be given to applicants who have had previous experience in a generating station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

Salary N.J.B., Class "G/16," £375; Class "G/14," £471 per annum.

Commencing salary will depend on qualifications and experience.

Applications, stating age, qualifications and experience, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, by April 26, 1952.

W. N. C. CLINCH,
Controller.
(S 90)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified engineers for the following superannuable posts:—

35/52 ASSISTANT MECHANICAL MAINTENANCE ENGINEER

Longford Generating Station, Coventry

Candidates should have had a sound engineering training and be thoroughly conversant with repairs and maintenance of a large generating station.

Commencing salary will be in accordance with Class "G," Grade 8 (£858 to £883 p.a.) of the N.J.B. Agreement.

Closing date for receipt of applications: April 28, 1952.

36/52 ASSISTANT SHIFT CHARGE ENGINEER
Burton-on-Trent Generating Station

Candidates should be experienced in the operation of modern power stations, and preferably be in possession of a Higher National Certificate or its equivalent.

Commencing salary will be in accordance with Class "E," Grade 9 (£567 to £579 p.a.) of the N.J.B. Agreement.

37/52 ASSISTANT SHIFT CONTROL ENGINEER
Longford Generating Station

Applicants should have had technical training and practical experience in a generating station and have a knowledge of control of steam generating plant and switchgear.

The salary for the above appointment will be in accordance with Class "G," Grade 14 (£453 to £471 p.a.) of the N.J.B. Agreement.

Closing date for the above vacancies: May 5, 1952.

Applications should be submitted on the official forms which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham. Please quote vacancy number.

L. F. JEFFREY,
April 4, 1952 Divisional Controller.
(S 87)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts:—

CHEMICAL ASSISTANT
Bankside "B" Generating Station.

Duties, generally assisting Station Chemist. Qualifications, matriculation or equivalent. Salary within range £160 to £470 p.a.

ASSISTANT ENGINEER (EFFICIENCY AND TESTING)
West Ham Generating Station.

Qualifications, Higher National Certificate and sound technical training.

Experience in investigation of technical problems of power station plant testing and efficiency required and knowledge of operating statistics desirable.

Duties will include keeping check on all matters concerning thermal efficiency of station. Salary, N.J.B. Schedule A, Class "H," Grade 11, £580 13s. p.a.

Applications, stating age, experience and qualifications, should be addressed to Divisional Secretary, British Electricity Authority, Ergon House, Horseferry Road, S.W.1, and be received within fourteen days of the appearance of this advertisement.

H. V. PUGH,
Divisional Controller.
(S 91)

NORTH EASTERN ELECTRICITY BOARD

Wear Sub-Area

APPLICATIONS are invited for the appointment of GENERAL ASSISTANT ENGINEER at Sub-Area Headquarters, Dunning Street, Sunderland. Applicants should have sound knowledge of theory and practice of illumination including public lighting. Necessary qualification: Graduate Membership I.E.E. and/or Higher National Certificate. Experience of a Commercial Officer's Department advantageous. Salary (Class "L," Grade 13, £596 to £625) and conditions of service in accordance with N.J.B. Agreement. Applicants outside the industry must apply to local Employment Exchange.

Applications, in writing, stating age, qualifications and experience, should be forwarded to the Secretary, Establishments, The North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne 1, within 10 days of the appearance of this advertisement. (S 92)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

MIDLANDS ELECTRICITY BOARD

DISTRICT ENGINEER required in the North Staffs Sub-Area, Stone District. Extensive experience necessary in the operation and maintenance of high and low voltage distribution networks up to and including 33 kV. and associated switchgear, transformers and protective system. Technical qualifications an advantage. Salary £788 per annum (N.J.B. plus "D" Grade III) superannuable.

Apply, within 14 days, to Sub-Area Manager, Midlands Electricity Board, 31 Kingsway, Stoke-on-Trent.

A. STEPHENS,
Secretary.
(S 99)

A WELL KNOWN COMPANY requires SENIOR ENGINEERS for its Meter and Relay Division in the Midlands. Ideal working conditions, salaries of up to £1,400 per annum.—Write, giving full details of previous experience, qualifications and age to Box No. 1653, Electrical Times. (S 61)

ACCOUNTS COST CLERK for Electrical Contractors, W. End. Previous experience essential.—Full details to Box No. 1623, Electrical Times. (S 8)

AN ELECTRICAL ENGINEER is required by a well-known company for interesting work in the London area. Good all-round knowledge of D.C. and A.C. machines of up to 50 h.p. and their control gear is essential. Applicants should be familiar with marine applications of these machines and be capable of preparing specifications and vetting and testing of designs.—Write, giving full details, mentioning ref: IDA, to Box No. 1647, Electrical Times. (S 69)

AN interesting vacancy exists at our Liverpool Works for a young GRADUATE ENGINEER with experience in Mechanical Engineering to work on the development of refrigeration apparatus and allied engineering. Previous refrigeration experience desirable, but not essential. Provision will be made for suitably housing the successful applicant.—Applications should be addressed, quoting reference 731A, to Central Personnel Services, English Electric Company, Ltd., 24/30 Gillingham Street, London S.W.1. (S 4)

ASSISTANT DISTRIBUTION ENGINEER required by The Steel Company of Wales, Ltd., for large integrated Iron and Steel Works. Applicants must have had previous operating experience and be thoroughly conversant with modern protective gear and control circuits. Good technical training essential. Previous industrial and/or manufacturing experience would be an advantage. Ability to co-ordinate work of technical staff essential.—Applications, stating age, education, training, qualifications and experience should be submitted in own handwriting to The Personnel Superintendent, The Steel Company of Wales, Ltd., P.O. Box No. 3, Port Talbot. (S 7)

ASSISTANT FOREMAN INSPECTOR for Electrical Department. Experience of fractional horse-power motors essential.—Apply Personnel Manager, Frigidaire Stag Lane, N.W.9. (S 45)

APPLICATIONS are invited for the position of ASSISTANT to the Commissioning Engineer of the English Electric Co. Ltd. Essential requirements: Engineering Degree or H.N.C., an engineering apprenticeship or works experience in heavy electrical or mechanical industry, good address and a tactful personality. Age between 28 and 35. The successful applicant will be based at Stafford, but may be required to do a certain amount of travelling.—Please write, giving full details, quoting Ref. 978 to Central Personnel Services, English Electric Co. Ltd., 24-30 Gillingham Street, London S.W.1. (S 44)

FOREMAN/JOINTER

A FOREMAN/JOINTER is required for work in Singapore and Malaya. The engagement will be on a 3-year agreement at a salary of $475.00 Malayan dollars per calendar month with a cost of living allowance of $175.00 Malayan dollars per month. (The current rate of exchange is $9.55 Malayan dollars = £1 sterling); bachelor quarters will be provided free. Air passage to Singapore will be paid and a return passage (with 18 weeks leave on full pay) will be provided on the satisfactory conclusion of the service period. Applicants should be unmarried and should have experience of all types of power cable jointing up to and including 11 kV. The successful applicant will be required to fly to Singapore in August, but in the meantime employment can be offered at London rates on cable installation contracts in Great Britain. Applicants should state age and experience in detail in addition to name and address.—Please apply to:

Box No. 1639
Electrical Times
(S 54p)

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

DEPARTMENTAL MANAGER required for promoting and controlling sale of High Frequency Equipment. Sound knowledge Pneumatic and Universal Electric Tools essential. German language an advantage.—State experience and remuneration required to Box No. 1619, Electrical Times. (R 471)

DRAUGHTSMEN having experience in the layout of unit type low tension panels and distribution equipment required. 5-day week. Staff pension fund.—Apply in writing stating age, experience and salary required, to the Personnel Officer, W. T. Henley's Telegraph Works Co., Ltd., Gravesend. (R 420)

ELECTRICAL DRAUGHTSMAN, some experience industrial installation work, required by consulting engineers, Victoria.—Write, giving experience, age, salary required, to Box No. 1659, Electrical Times. (S 95)

ENGINEER, technically qualified and experienced in the design and manufacture of supertension cable, required for permanent senior appointment.—Applications, which should be fully detailed and marked "Engineer," will be treated in strict confidence. Aberdare Cables, Ltd., Aberdare, Glam. (S 67)

JOHN BRUCE AND PARTNERS, Consulting Engineers, invite applications from MECHANICAL, ELECTRICAL AND CONSTRUCTIONAL ENGINEERING DRAUGHTSMEN. Applicants should have a wide experience of power station layout work, industrial steam and electrical work, supervision of site work and, for one or two vacancies, a knowledge of Spanish is desirable. Applicants should not be over forty-five years of age. Location of office work—London.—Applications, in the first instance, should be addressed to Box No. 1627, Electrical Times. (S 19)

MANAGER required for Suburban Electrical Retailers and contractors (London). Good opportunity for man with knowledge and initiative.—Write stating full details of experience and salary required. Box No. 1655, Electrical Times. (S 82)

OUTSIDE REPRESENTATIVE required for south of England for promoting sale of High Frequency Tools. Applicants should have sound knowledge of Pneumatic and Universal Electric Tools.—State experience and remuneration required to Box No. 1617, Electrical Times. (R 470)

PERMANENT positions with excellent opportunities will be offered to applicants suitably qualified for the following:—

(a) DESIGNERS experienced in electronic control gear. Good electrical and mechanical design and layout ability essential.

(b) SENIOR DRAUGHTSMEN with electrical mechanical experience required for motor control gear. Knowledge of electronics advantageous, thorough shop training and extensive drawing office experience essential.

(c) DRAUGHTSMEN required for mechanical and electrical work on industrial electronic equipment. Experience on this type of product, whilst an advantage, is not essential, and men with good electrical or mechanical drawing office experience will be considered.

Vacancies exist in a new factory in the Stoke-on-Trent area or in the Company's London office.—Replies, giving full details of training, experience, also age and salary required, to be sent to Box No. 1657, Electrical Times. (S 93)

SALES MANAGER for a progressive firm wanted with considerable experience of face to face selling, sales office work, and sales administration. Capable of top management and of dealing at director level. Must live in the West Midlands.—Send full details to Box No. 1643, Electrical Times. (S 66)

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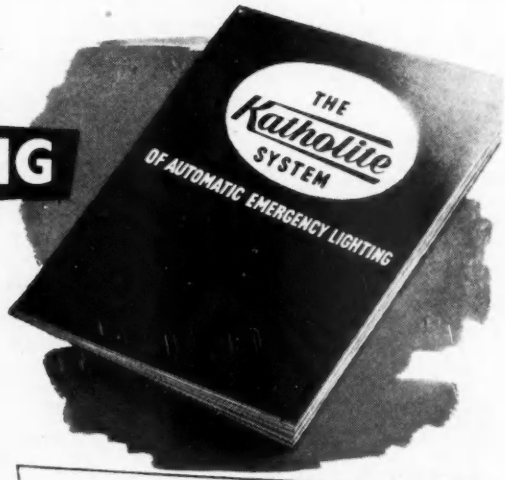

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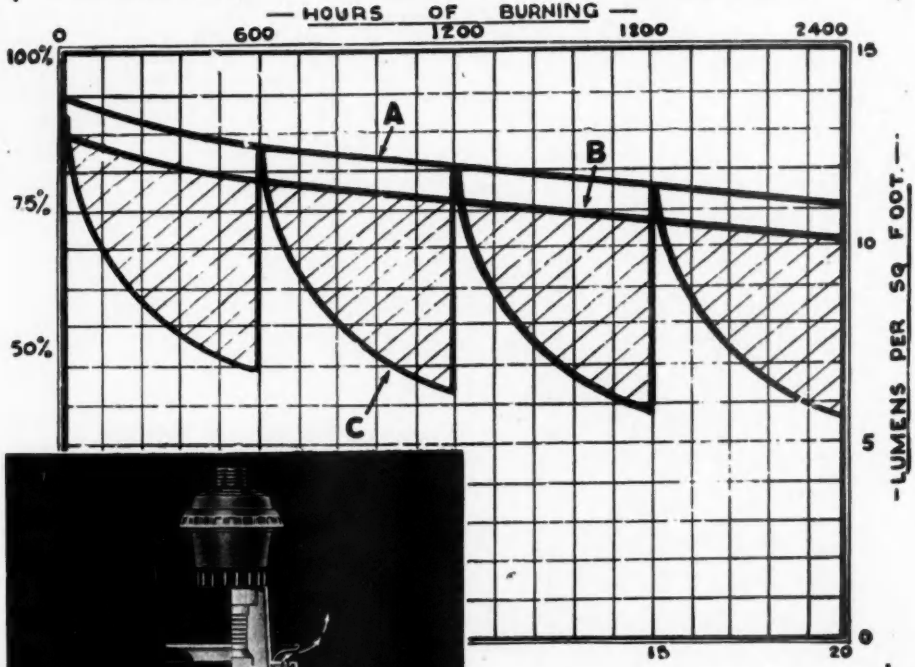

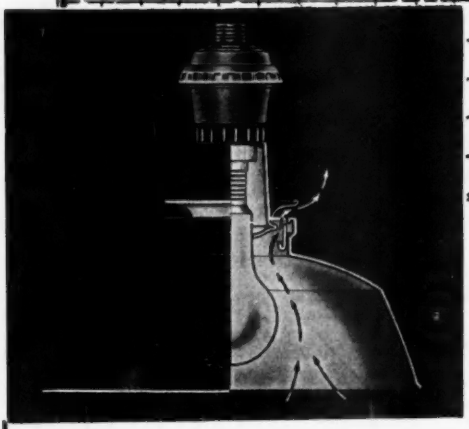

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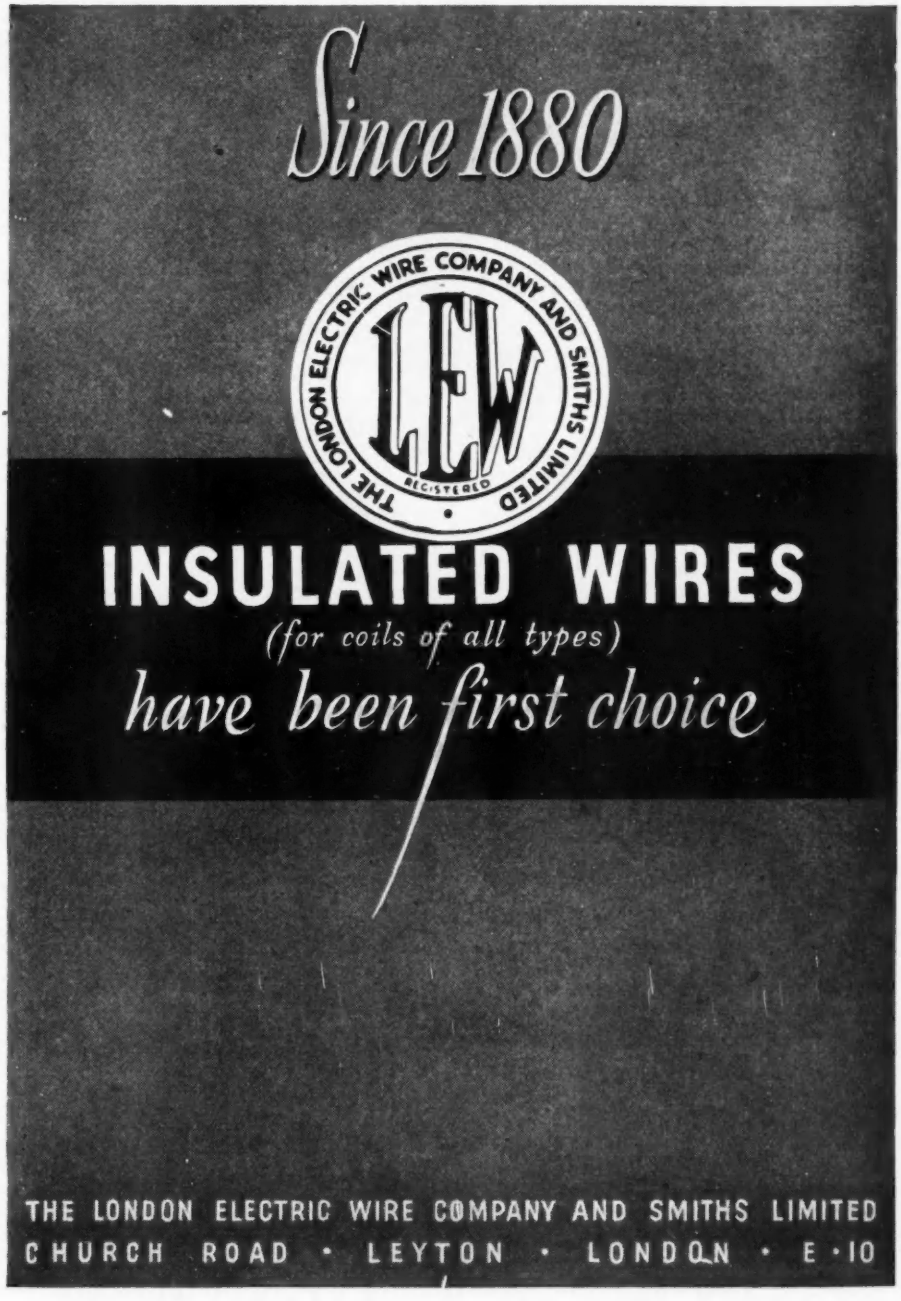
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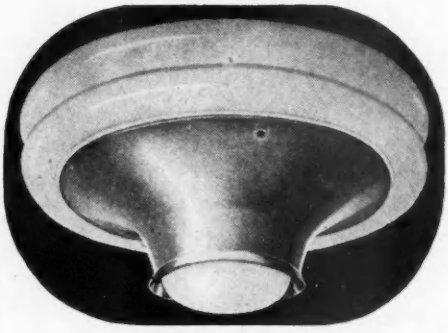

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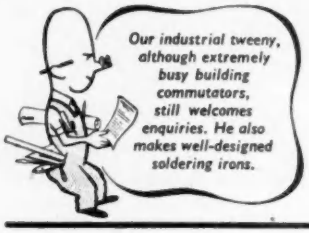
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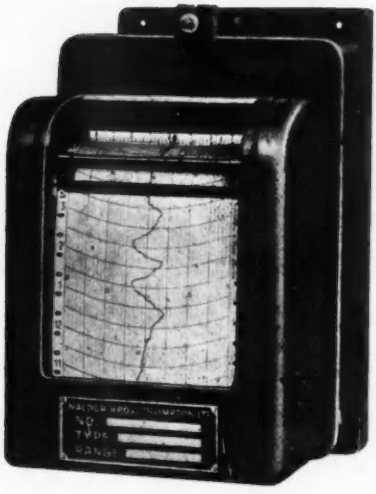

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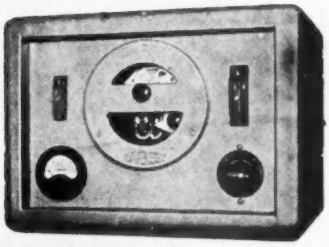

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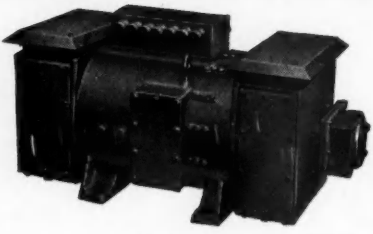

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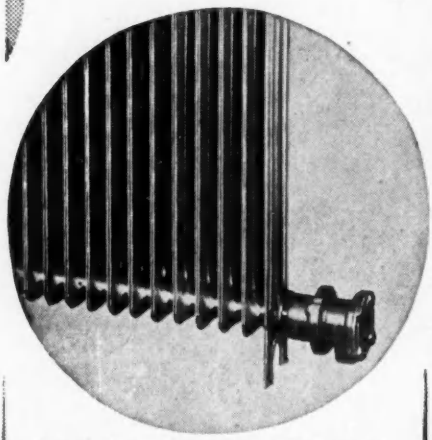

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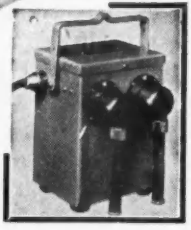

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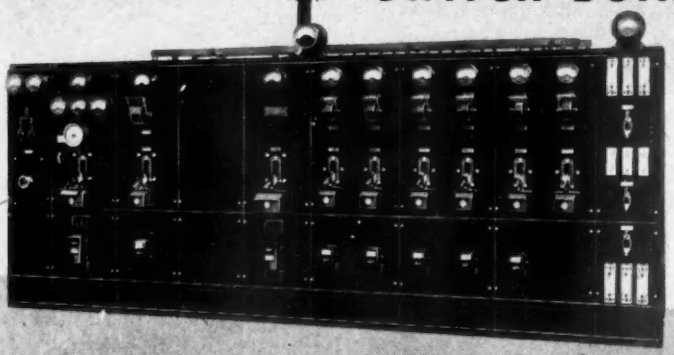

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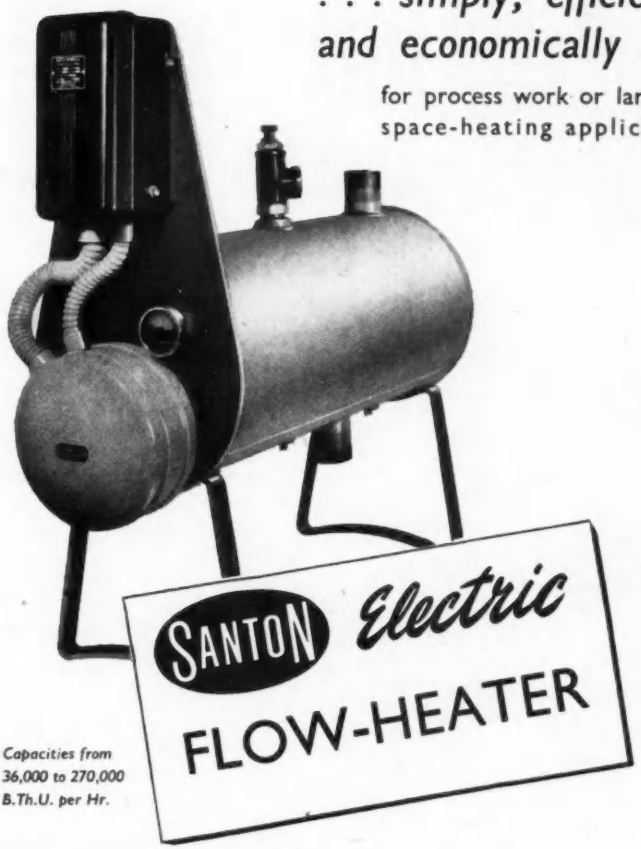

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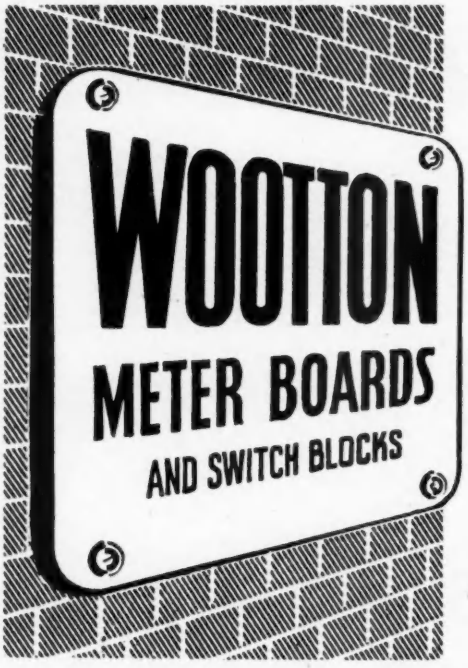

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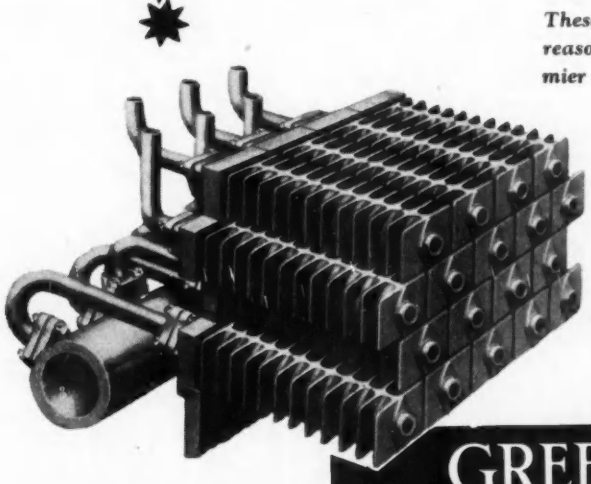

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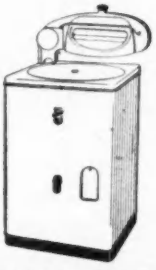

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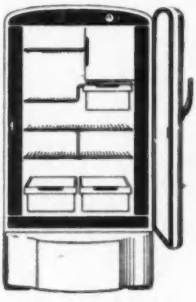

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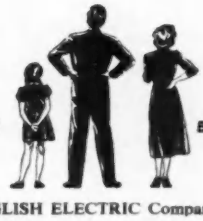

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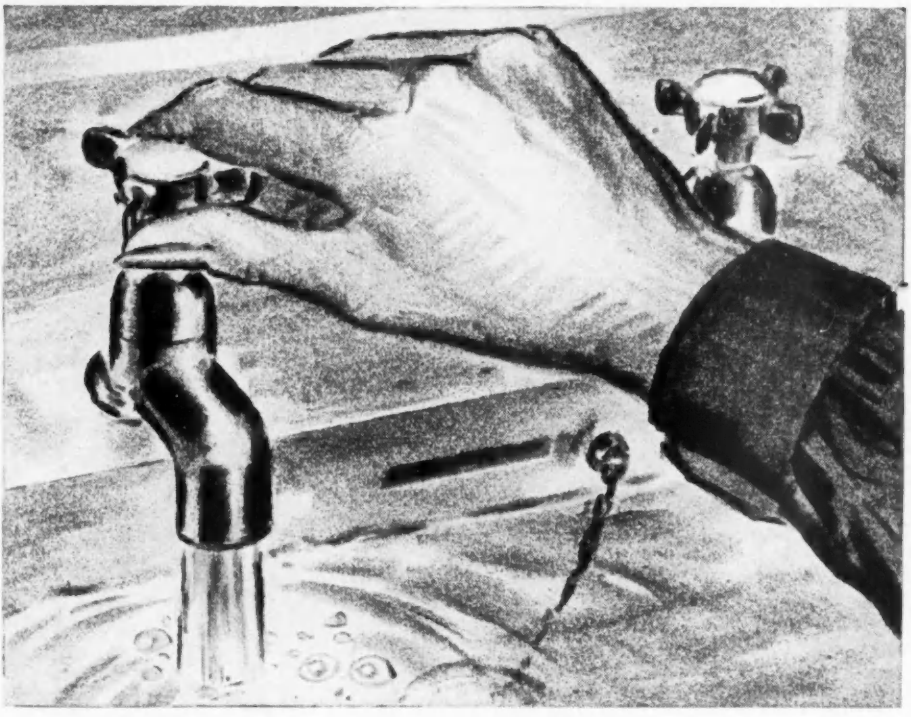

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